

*Nelson Bryant*

# JOURNAL *of* FORESTRY



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## EDITORIAL

### POLITICS VERSUS ADMINISTRATION

THE course of the federal government in the last two years has afforded no ground for rejoicing by those who believe in public personnel administration based on merit, not political pull. That there have been casualties in the ranks of foresters in state employ is well known. The Society of American Foresters is for the merit system. It is worth while to ask why.

Cynics will perhaps find the primary motive in group interest. Like a trade union, they may say, we are banded together for mutual protection. To hold our places on the public payroll more securely, we make common cause against whatever threatens to pry any one of us loose from his job, and seek to rivet on the Nation and the states a self-perpetuating bureaucracy.

Skeptics are not lacking amongst our own number. The question is asked why foresters should be held sacrosanct. Too great security works, we are reminded, against the best public interest. It protects mediocrity and breeds stagnation. An occasional shake-up on the whole makes for progress. We must be practical, and take things as they come. Political forces and motives are inescapable realities, to which sensible men will accommodate themselves without self-defeating, quixotic idealism. Even when men lose their jobs because they have got in the way of poli-

ticians, there are likely to be reasons why, on the merits of the case, their retention cannot be wholeheartedly urged. We are serving a cause, and must accept the fortunes of war.

The trouble with all this is that it is superficial. The cause that we serve is that of the public interest. In that cause we expect casualties, and are prepared to accept them without undue lamentations; but to allow public administration to be made the complaisant tool of partisan, factional, or personal political domination is betrayal of a public trust. In the long run, successful public administration turns on efficient and impartial performance that deserves and obtains popular approval and support. To the extent that administration is deflected from the objective of public service to that of serving special interests, it is sowing the seeds of its own failure and forfeiting its just claim to popular support. In plain terms, it has sold out, or been sold out.

A political organization or party machine is always a special interest. It is in the control of a group of individuals seeking to retain or increase their political power, as against that of their rivals or opponents. Whether the motives of these individuals are selfish or altruistic is irrelevant. They may be patriots, or mere professional brokers of governmental favors, or players of the game for the love of it, just as many men seek power in



business. In any case their first objective is to win elections.

In a democracy the people are supposed to choose—to elect—from rival candidates for office those whom, for a given period, they wish to entrust with power. A party organization so placed in power is endowed with a specific and limited public trust, to be accounted for not as service rendered the party but as service of the general welfare; and democracy is thwarted in the absence of a freely exercised public judgment on the record of trusteeship when the time comes for another election.

That public office is a public trust few men in public life would have the boldness openly to deny. That it is often used for other purposes everyone knows. When those in control of a party machine or political organization, having obtained for their nominees the trusteeship, feather their own nests at the expense of the public treasury or through the sale of political favors, government is recognized as corrupt. When the free choice of the electorate is blocked through the coercion, intimidation, or bribery of voters, democracy yields to the rule of force or money. Corruption in the conduct of government and political domination maintained through some form of force, fraud, or crooked use of wealth go hand in hand. By defeating accountability the second facilitates the first. Bribery, open or disguised, and coercion are the twin tools of government by and for special interests. Rule by force is despotism; rule by wealth, plutocracy; rule by control of the public purse, breach of trust. All are subversive dangers against which those of us who believe in the soundness of the principles of American democracy have an obligation of good citizenship to be eternally watchful.

Historically, control of the army or police forces and control of the public purse have been the time-honored means of holding political power in defiance of

the popular will. Today, in Europe, popular government is widely giving place to despotism. Many people in this country are sincerely disturbed lest control of the use of great appropriations may rivet upon the body corporate a rule maintained through the power to say who shall receive and who shall be denied governmental favors. Can the administration of public affairs be conducted as a public trust, carried out with an eye single to the furtherance of the general interest? Or must public administration be deflected and prostituted to the service of personal ambitions, special interests, and party organizations seeking to hold their grip on the powers of government? That in essence is the question raised when moves are made to "politicalize" administration.

In a great eastern state a change of political parties last fall has brought about a personnel shakeup in the state Forest Service such as has not been known through many years of excellent performance. Doubt and anxiety continue, and morale is badly shaken. In part the fault goes back to the failure of previous administrations to make its field force fully nonpartisan. Men who have exerted themselves actively in their communities, on the strength of their official positions, to aid one party cannot complain much if they find themselves displaced when a different party succeeds to power. The fundamental question, from the standpoint of the interest of the state in having a capable and honest administration of its forests and forest laws, is not whether detrimental personnel changes are made at the behest of politicians, nor whether the efficiency of the organization is temporarily or even permanently lowered through weakened morale and discipline. The fundamental question is whether the test for retention in the service of the state is to be service of the public or service of a political organization.

A forest officer who, in order to re-



main in good standing and feel safe in his job, must make himself solid with his county committeeman by subservience in choosing, promoting, disciplining, and dismissing his local help and by conducting his transactions with the public as may be desired for political rewarding or punishing, becomes not a public servant but a tool. Were not our American consciences indurated by long familiarity with what are essentially practices of graft—that is, the diversion of public funds to essentially private ends and the levying upon the time and salaries of public officers to give a controlling political group the upper hand over their rivals—such things would bring their own cure. Until American public opinion does attain to the degree of intelligence and sensitiveness necessary to enforce a strict and absolute severance of public administration from patronage control and party service, with a true merit system as the means of segregation, the country will be ill equipped for obtaining through government the advancement of the public welfare obtainable in no other way. As Dr. Leonard White of the present Federal Civil Service Commission recently said:

“The issue is still in doubt whether a government which takes positive steps to insure the economic security of its people can succeed in this exceedingly complex venture. . . . Unless we have assurance of a better civil service than that to which we have been accustomed, it is perilous, to say the least, to embark upon a broad program of social reorganization which rests primarily upon the activity of government. . . . By and large, it is the system which is at fault, and the system which must be improved. . . . The laying of foundations for an administrative corps in harmony with the prevailing structure of American life and government I believe to be the most important immediate task. Every other great civilization has preceded us in this respect, and we are already late.”

The term “civil service” is often loosely used as synonymous with the merit system. The initial law prescribing a merit system in the federal civil service was passed in 1883; and because it concerned employees of the civil (as distinguished from the military) arm of the executive government it has been known as the original civil service law. It did not, however, initiate the merit system, which was the basis of civil service employment during the first forty years of the Republic by customary practice down to Jackson’s administration; it does not apply to the entire civil service, but only to that part brought under it through inclusion in the “classified” civil service; and while its purpose was both to require recruitment on the basis of a competitive showing of qualifications for specific duties and to prevent advancement, demotion, or discharge on other grounds than merit, the laws still fall far short of providing a basis for a thorough-going merit system of personnel administration.

Merely keeping politics from dominating is far from sufficient to assure an efficient, highly trained, loyal and devoted working force placed and used to best advantage. Personnel administration is one of the subdivisions of the fast advancing science and art of business administration. Its upbuilding, whether in private or public large-scale organizations, is a highly constructive undertaking for experts. Without it, output and quality of work must suffer. It can make the public service a worth-while career for men and women of first-class ability. The reason for demanding that administration as a governmental function be rigorously separated from the business of carrying elections and strengthening political organizations is not primarily to give faithful and competent employees security in their positions, but is primarily to provide the essential prerequisite for just, honest, and efficient government capable of meeting successfully the imperative requirements of present-day society.



# THE POST-CODE STATUS OF CONSERVATION

BY JOHN B. WOODS

In the June number of this JOURNAL, Mr. Woods summarized the Lumber Code situation as of May 7th. Since that time the N.R.A. foundations of all codes have been swept away. The code principle was peculiarly applicable to the problem of forest conservation, and it is most regrettable that the time was too short and government enforcement too lax to permit a fair trial and demonstration. There still remains a reasonable hope that out of the wreck will be salvaged the spirit of cooperation of government and industry and the essential framework of a joint conservation program.

WHEN, on the morning of May 27, 1935, Chief Justice Hughes rose and read the unanimous decision of the Supreme Court of the United States that the National Industrial Recovery Act was unconstitutional, one phase of the New Deal drive toward a managed economy was brought to an abrupt close.

From that moment, regardless of what Congress might do, unless and until the people of the country should further amend our Constitution, the industrial groups previously conducting their affairs under approved codes of fair practice were obliged to recognize that the element of direct government enforcement of code provisions was eliminated. Presumably, members of industry might continue to observe such code provisions as do not conflict with anti-trust laws; in fact, the Administration appeared quite anxious to have observance of wages and hours provisions voluntarily maintained. And presumably, there will be a continuation of the use of the government's purchase contract leverage to enforce compliance with wages and hours and certain trade practice standards set up by codes. But the imposition upon unwilling members of an industry of rules of conduct, framed by willing members, no longer had legal basis or direct government support.

For the Lumber and Timber Products Industries, the curtain had been rung down upon code enforcement with the withdrawal of the Belcher Case. Two months of effort at voluntary code com-

pliance had served to prepare those industries for the future. The immediate problem was simply to wind up the affairs of the Lumber Code Authority and turn back to the Regional Associations and the National Lumber Manufacturers Association such features of code activity as might be legal and worth preserving.

Regional Associations were queried as to their intentions in regard to maintaining voluntary industry efforts to carry on the provisions of Article X. Seven Associations, representing approximately 75 per cent of national lumber production, replied that the work would go on, by education and voluntary observance as vigorously as funds might permit. Three groups, because of serious disorganization growing out of the breakdown of code enforcement by government, were unable to promise more than future efforts to reinstate conservation activities.

The Joint Committee of the National Article X Conference met in Washington on June 12th with the Secretary of Agriculture, the Chief Forester, the Manager of the National Lumber Manufacturers Association, and other interested persons as its guests, discussed the situation, and adopted the following resolution:

WHEREAS, for the first time in American history, there has been formulated, under the provisions of Article X of the Lumber Code, a comprehensive national program of joint action by industry and public agencies to conserve and sustain the production of forest resources, and

WHEREAS, it has been recognized that



the extent to which these undertakings by industry under such a program are capable of successful accomplishment depends upon the extent and character of public cooperation, and

WHEREAS, the Lumber and Timber Products Industries, in the face of grave difficulties, have shown their serious purpose and good faith and have made sufficient progress to demonstrate the feasibility of this joint plan of action, and

WHEREAS, the considerable public contributions to the joint program have been made possible largely by the use of emergency funds, and this condition should be corrected by the prompt enactment of federal and state legislation, to effectuate the pertinent recommendations of the Forest Conservation Conference, which would aid, inspire, and challenge private owners, and

WHEREAS, in accordance with the provisions of Article X, a program of proposed federal legislation, founded upon the recommendations of the Article X Forestry Conference, has been transmitted to the President of the United States by the Secretary of Agriculture, together with his recommendations, and

WHEREAS, the unconstitutionality of the National Industrial Recovery Act does not affect the basic soundness of this joint conservation program, but simply renders further industry action under codes unenforceable, requiring that other methods be devised for the performance by industry of its proper part,

*It is therefore the recommendation of the Joint Committee of the National Article X Forestry Conference:*

That the Joint Conservation Program, recommended by the Forest Conservation Conference and further developed and established by appropriate agencies and approved by this Committee, is adequate, feasible, and should be carried forward without change, except as to method;

That the Lumber and Timber Products

Industries be urged voluntarily to continue to carry out the provisions of Schedule C and the Rules of Forest Practice through their trade associations and by their individual members;

That all other forest-using industries and all owners of forest land, whether public or private, including farm woodlots, be urged to join voluntarily in this enterprise;

That the U. S. Forest Service and other public agencies, federal and state, be urged to continue and enlarge their cooperation in carrying out the work toward the objectives set up under Article X;

That in the pursuit of the federal and state forest acquisition program, prompt steps be taken by the U. S. Forest Service to bring about cooperation of federal and state authorities and representatives of private ownership and the forest industries in working out the place of each type of ownership in sustained yield units;

That the legislatures of the several states containing forest lands be urged to meet the wishes of the President of the United States, as expressed in his letter of January 2, 1935, by early enactment of appropriate laws to aid in carrying forward this joint program;

That the President of the United States be respectfully urged, as promptly as is compatible with the national interest, to submit to the present Congress the program of forestry legislation founded upon the recommendations of the Joint Committee of the National Article X Conference and approved by the Secretary of Agriculture;

That public statements of intention to carry forward the forest conservation program be issued by authoritative spokesmen of both industry and the public.

The Executive Committee of the National Lumber Manufacturers Association met in Chicago June 18th and 19th and after a thorough discussion of the sit-

uation with managers of its affiliated Regional Associations, adopted the following resolution:

WHEREAS, the action of the President of the United States, pursuant to the recent decision of the Supreme Court, in dissolving the Lumber Code has terminated the forest conservation undertaking declared in Article X and in Schedule C of the code, and

WHEREAS, it is, nevertheless, the intention and determination of the lumber industry, so far as its facilities and the extent of public cooperation will permit, to continue voluntarily its organized and industry-wide effort to accomplish the conservation objectives declared in the Lumber Code, and for this purpose to cooperate with agencies and representatives of the public, and to seek the cooperation of other forest industries,

THEREFORE, BE IT RESOLVED that the Executive Committee of the National Lumber Manufacturers Association hereby reappoints as the industry members of the Joint Committee of the National Forestry Conservation Conference, Messrs. Greeley, Jewett, Mason, Moore, and Recknagel.

To give effect to the above policy, the Executive Committee further directed the immediate establishment of National Lumber Manufacturers Association staff personnel to cooperate with the Regional Associations and the government in promoting the industry and public programs of forest conservation developed under Article X. This means that the Lumber Code Authority Forester will continue

with the National Lumber Manufacturers Association.

To summarize: the legal basis of code conservation enforcement no longer exists. Instead of twenty-six technical foresters employed by code agencies, fourteen remain on the job for industry. But industry desires to go forward, and with the stimulation that can come with the enactment of the long promised federal legislative program, the lost ground can be regained. It is apparent that legislation to strengthen state forestry and to afford forest credits is most urgent. Education of operators to extend the application of improved forest practices must replace the lost authority to regulate cutting. Cooperation by the U. S. Forest Service is promised, and can be of inestimable aid in education, and in working out joint ownership blockings of forest lands for sustained yield. Mr. B. F. Heintzleman, who organized the Forest Service cooperation and later served N.R.A. as Deputy Administrator for Conservation, has returned to the Forest Service and will carry on direction of cooperation with the aid of a strong regional staff.

The action herein described lends substance to the assurance given by the Secretary-Manager of the National Lumber Manufacturers Association to the Executive Secretary of the Society of American Foresters shortly after the withdrawal of the Belcher case, that industry agencies will continue the development of the forest conservation work, and the effort to encourage sustained yield for management.



# FORESTERS CHALLENGE CONSERVATION CLAIMS OF DEPARTMENT OF THE INTERIOR

PRESS RELEASE OF JUNE 24, PREPARED BY PROFESSOR H. H. CHAPMAN, PRESIDENT, SOCIETY OF  
AMERICAN FORESTERS, WASHINGTON, D. C.

THAT Senate Bill 2665, sponsored by Secretary Ickes, to change the name of the Department of the Interior to that of Conservation and Works, should not be passed is the position taken by the Society of American Foresters, which has a membership of 2,500 professional foresters. Professor H. H. Chapman, of Yale University, President of the Society, says:

"Successive Secretaries of the Interior, including Albert B. Fall, Lane, Wilbur, Works, and Ickes, have endeavored to create in the public mind the idea that this department is the logical recipient of all federal activities to which the term 'conservation' can be applied. In making these claims, they have cited only such facts as suited their purpose and have persistently ignored the entire field of conservation activities of the Department of Agriculture.

"The Society of American Foresters holds that such proposed concentration and transfer of conservation of forests, grazing, and wildlife from Agriculture to Interior, would be against the public interest and would tend to destroy the efficiency of existing agencies now operating successfully in the Department of Agriculture. The purpose of these repeated efforts of the officials of the Department of the Interior to extend its functions to include the work of the Biological Survey, the control of all public grazing, and the U. S. Forest Service, is to replace in this manner losses suffered by the decline of its principal activity, namely, the dissipation of the vast areas of public lands by grants to private owners. This policy, pursued unremittingly until all lands worth taking, and which had not been saved to the public by other agencies, were gone, has been the chief cause of the unparalleled waste of natural resources for which the nation is now suffering the consequences.

"Natural resources fall into two sharply defined classes, those of a mineral character, which are exhaustible; and those produced by the soil, which are renewable. In the latter class fall agricultural crops, forests, forage and grass crops, and the domestic and wild animal life dependent on these crops. Abuse of the vegetative cover of the soil, be it forests or grass, disturbs the balance of nature and destroys the soil itself by loss of fertility and erosion by wind and water. The Department of the Interior, not content with retaining control over the exhaustible mineral resources of the nation, now, for purposes of bureaucratic expansion, seeks to grasp the biological functions which are the natural heritage of the Department of Agriculture, and which the Department of the Interior is wholly unfitted to administer. A few of the historical facts to demonstrate this contention are as follows:

"The system of National Forests initiated by Presidents Harrison and Cleveland was extended and developed only after President Theodore Roosevelt had secured their transfer from the Department of the Interior to the Department of Agriculture, which understood and was competent to handle resources dependent on soil and biological functions. The successful management of the National Forests since that time is due to the fact that they were in the hands of men trained in the science of forest production as one of the fundamental uses of the soil.

"Through the National Forest policies the nation has learned the meaning and possibility of conservation of renewable resources dependent on plant and animal life. After thirty years of demonstration, paralleled by appalling destruction on private lands, an effort is now being made to extend these principles to the entire soil resources of the country.

"As a by-product of National Forest management and use of all resources for the greatest good, the Forest Service developed and perfected a system of controlled use of grazing on these Forests, under which public interests were safeguarded and the acquisition of monopolistic, perpetual rights to the ranges was prevented. Meanwhile, the Department of the Interior was using every effort to dispose of the vast remaining area of the public domain under such acts as the stock-raising law of December 29, 1916, which honeycombed this domain with private claims of 640 acres each, an area incapable of supporting families dependent on the grazing resources. Unregulated free grazing on the public domain continued under its jurisdiction until the vegetative cover was largely destroyed, and widespread erosion took place to the permanent damage and depletion of soil resources.

"Finally in June, 1934, a bill to regulate grazing on the public domain was passed, giving the Department of the Interior power to conserve this resource. What is the result? The original provisions of this bill were formulated by officials in the Forest Service in the Department of Agriculture, based on their thirty-year experience in protecting the public from encroachments of private interests.

"But before it was passed most of these safeguards had already been eliminated with the consent of the Department of the Interior and the Taylor Act as it now stands gives to the stockmen practically complete domination of the grazing resources on 178,000,000 acres of the public domain through provisions for prevention of reductions of stock, control of policies by boards composed of stockmen and other devices, all of which had been previously advocated by stockmen but had failed of establishment on the National Forests.

"Now the Department of the Interior desires to 'coördinate' the grazing policies of the National Forests with those estab-

lished by the Taylor Act, and this move is being supported by certain live-stock interests, including officials of the National Livestock Association, who anticipate the extension of such privileges to the National Forest lands, on which they have so far been required to coördinate their interests with public welfare, game recreation and timber growing. The more enlightened and experienced stockmen are not in favor of abandoning the system of governmental regulation built up by the Forest Service and are distrustful of the wisdom of permitting members of their own industry to determine, not only for themselves but for the public, the character and degree of control to be exercised over the grazing privilege on public lands.

"The breaking down of the safeguards against overgrazing on National Forests by such 'coördination' would imperil the existence of the forests themselves and have a disastrous effect on soil erosion which by this time has been checked and controlled on these Forests by the reduction of stock brought about by the Forest Service.

"In the brief period of a year, during which the Department of the Interior has undertaken the administration of the range on the public domain, no evidence has been forthcoming that this department is competent either to solve the problems of restoring this resource or of regulating it in the interests of the public. No reductions of stock have been proposed and it is unlikely that any will occur under the provisions of the Taylor Act.

"The restoration of renewable natural resources dependent on the soil is the basis of our future national welfare. Forests, range, and wild life are inherently related to the prosperity of agriculture, the health and recreation of our town-dwellers and industrial welfare. Responsibility for all phases of the problem of restoration and management of the soil



and its products must be concentrated in the Department of Agriculture which through the Forest Service, the Biological Survey, and all related activities has demonstrated its capacity and understanding of these problems.

"The inherent inability of the Department of the Interior, as such, to comprehend and grapple with the problems of organic resources has been shown by many incidents, perhaps the most startling of which is the statement of Secretary Ickes on June 4, 1935, in his testimony before the House Committee on Expenditures in the Executive Departments, on H. R. 7712 (the companion bill of S. 2665) who said:

"This whole question of terminology has become so chaotic that the average

man cannot tell a cabbage from a squash. Some people even talk of trees as a growing crop like peanuts or onions and delineate them as an agricultural product.'

"The entire civilized world, including America, long ago came to recognize the fact that trees are a growing crop, capable of renewal, and not merely a mine to be exhausted. The Secretary of the Interior alone appears to hold tenaciously to that outworn creed.

"The administration of grazing on the public domain should be transferred to the Department of Agriculture where it naturally belongs. This department alone is capable of redeeming the trust imposed by the need for conservation of our soil, our forests, our forest resources, and our wild life."

### ICKES-CHAPMAN LETTERS

The above press release put out by President Chapman on June 24 gave rise to the following correspondence:

June 27, 1935.

Professor H. H. Chapman, President,  
Society of American Foresters.

DEAR SIR:

I have before me a press release of the Society of American Foresters, the heading of which is "Foresters challenge conservation claims of the Department of Interior." This release, except for a brief introductory paragraph, consists entirely of what purports to be a statement by you. I do not suppose for a moment that you wrote this since it bears strong internal evidence of having been prepared by certain interests here, yet since you permitted it to be issued in your name, you are undoubtedly willing to be held responsible for it.

May I say that the linking of my name with that of former Secretary Fall is highly offensive to me. This is a studied and deliberate affront to which I take the strongest possible exception. There is no more warrant for this unprovoked assault upon my character than there is for me

to say of you, on the basis of your statement, that you are a fair fighter and an honorable opponent. One is just as far from the truth as the other.

Your sneering reference to me as though I were one in spirit with Mr. Fall was undoubtedly intended to be insulting. Ignoring chronological order, you start with Mr. Fall's name in a list of Secretaries of the Interior and you print it in full, evidently with the enjoyment of one who has played a clever but questionable trick. Messrs. Lane, Wilbur, and Work you do not tarry over. You put their names in as quickly as possible and then end with Ickes. Of course, you had to include some other names with those of Mr. Fall and myself, but you did so in a way to emphasize rather than to conceal the name of my malodorous predecessor.

Some men prefer to fight with stink bombs because they enjoy the smell.

I will not pause over the puerile argument that fills some four and a half pages

of your circular. After all, it is not unusual to set up a straw man in order to show one's intrepidity in knocking it down. These feeble utterances I have dealt with here in open debate when they were advanced by the men who apparently wrote your circular for you.

I cannot forbear, however, from thanking you for telling me that trees really do grow. My doubts on the subject are now happily resolved. I bow in meek acquiescence before the erudition of a man who so deservedly occupies an important chair in a great university. But do you still insist that trees are "a growing crop like peanuts or onions?"

I venture to inquire by what authority you spoke as you did in the name of the Society of American Foresters? Did you take a referendum of the membership or did you call together a meeting of the Board of Directors? If the latter, where and when was the meeting held and who were in attendance? If such a meeting was held, how was the case of the despised Department of the Interior presented and by whom? Even the President of the Society of American Foresters, below-the-belt fighter though he may be, would, of course, insist upon the right of even a contemptible department of the government to be heard on so important an issue as is involved in the bill upon which you have poured forth the vials of your uninformed wrath.

Very truly yours,

HAROLD L. ICKES,

*Secretary of the Interior.*

205 Prospect Street,  
New Haven, Conn.,  
July 3, 1935.

Hon. Harold L. Ickes,  
Secretary of the Interior,  
Washington, D. C.

DEAR SIR:

I take pleasure in answering your courteous inquiry of June 27, 1935, regarding the authorship and origin of the press

release of June 24th entitled "Foresters challenge conservation claims of the Department of the Interior."

The authorship of the article, which you question, is, as stated, my own. It was prepared by me personally. I have never in the thirty years of my connection with the faculty at Yale and with forestry found it necessary to employ ghost writers or submit to the dictates of bureaucratic superiors in the determination of what should be written or said in the public interest.

Answering your inquiry as to my authority for issuing statements on the subject of possible transfer of conservation agencies to the Department of the Interior, I am glad to inform you that this authority was voted by the Executive Council of the Society of American Foresters on October 31, 1934. This council consists of eleven men, five of whom are connected with educational institutions, including Yale, New York State College of Forestry, Duke University, University of Washington, and University of California; two are state foresters, of Connecticut and Maryland, respectively, and four are in federal employ. This council is a representative body elected biennially by ballot of the entire membership of 2,500 professional foresters, under a system of proportional representation. Any act of the council may be submitted by ballot to the members on a petition signed by 50 members. If you will examine the several hundred letters and petitions received by President Roosevelt last fall on this matter, you will have the evidence that the members of the Society of American Foresters approve of this official attitude of their Executive Council.

The professional societies of America, including forestry, engineering, law, medicine, and others, reserve the right to express opinions on questions affecting public welfare and lying within their field of training, nor do they intend to be bulldozed, brow-beaten, nor coerced into either



silence or acquiescence when measures are proposed that tend to jeopardize the prospects of technical success in the field of their professional training. The ability of heads of federal departments to muzzle public employees even in other departments does not yet extend to professional societies, whose membership, as in forestry, extends to all fields of employment, and is not confined to federal payrolls. The Executive Council of the Society of American Foresters is no more under the domination of the Secretary of Agriculture than it is of the Secretary of the Interior.

The above statement covers my authority. I wrote the statement as President of the Society. The sources of my information were the printed records of your own testimony before Senate and House Committees, your mimeographed news releases, and the historical facts with which I have been familiar during my 30 years' connection with the development of forestry in the United States, as a member of the Yale forestry faculty and in continuous contacts with national affairs over this period, and active participation on several previous occasions in defeating similar attempts to capture the control of conservation of organic resources by your department.

What I wish to emphasize, in view of your assumption that I did not write this statement, is that the opposition to your proposals, which you attributed in your public testimony to a few members of the U. S. Forest Service, comes instead, spontaneously from the entire profession of forestry, from all the interests which are represented by agriculture and soil conservation, and from such widely representative popular bodies as the American Forestry Association and numerous other organizations.

Are you aware, Mr. Secretary, that in order to supply you with proof of the charge which you have made to me that this opposition was inspired by "certain interests" which you have stated to be

the Forest Service, the Department of the Interior has been engaged in sending out inspectors to run down the source of letters of protest against Senate Bill 2665, and to try by inquisition to establish the fact that these letters were thus inspired and were not spontaneous? Has it come to the point when citizens are subjected to cross examination for expressing an opinion contrary to the objectives to the Department of the Interior? Was this done with your knowledge or consent?

If your purpose in introducing this apparently innocuous bill to change the historic name of the Department of the Interior to that of Conservation and Works was wholly altruistic, why did you display so much indignation when Mr. Silcox, as the representative of the Secretary of Agriculture, endeavored, unsuccessfully, to secure from you at the Senate hearing a statement as to what agencies would be considered as falling under the term "conservation?"

The error you have fallen into, Mr. Secretary, is in supposing that this little bill could be slipped through a committee without attracting attention, thus legalizing the claims that successive secretaries of the Interior, including Lane, Fall, Works, and Wilbur have put forth in an effort to bolster up the waning activities of their department, which historically had pursued the suicide route of scattering the public land resources of the Nation to the winds of heaven, not only figuratively, but literally, through false economic theories underlying the stock grazing homestead laws and the failure to protect the public domain from ruinous overgrazing.

Facts cannot be brushed aside as puerile, nor public opinion treated with silent contempt. Soil and organic resources such as *forest crops*, and wild life must be placed under unified control in the Department of Agriculture, which alone has shown its capacity to administer vital problems created by neglect and

destruction of vegetative cover on our plains and mountains.

Sincerely,

H. H. CHAPMAN,  
*President.*

## GIFFORD PINCHOT'S OPEN LETTER TO THE PRESS

"I appeal to you because the National Forests are again in serious danger.

"Another attempt is under way to get the National Forests and the forest work of the Government transferred from the Agricultural Department, where the forests are safe and the work well done, back to the Department of the Interior, from which they were taken because of wretched management.

"The present attempt is made under cover of an effort (Senate Bill 2665) to change the name of the Interior Department to the Department of Conservation and Public Works. The transfer of the National Forests and the Forest Service is not mentioned in the bill, but is planned for later on.

"Conservation is too broad a subject to be confined to any one department. Nearly all of them deal with it in one form or another. A Department of Conservation would be almost as illogical as a Department of Typewriting or a Department of Wastebaskets, which everybody has to use.

"The conservation policy itself, and about every important conservation movement for the last thirty years, originated in the Department of Agriculture. It has shown practical horse sense in dealing with natural resources intelligently, uprightly, and without fraud or loss.

"In contrast, the record of the Interior Department is far and away the worst in Washington. Every natural resource, without exception, that has been held for disposal by the Interior Department—public lands, Indian lands, coal, oil, water power, and timber—has been wasted and squandered at one time or another. It is one long story of fraud in public

lands, theft in Indian lands, and throwing the people's property away.

"Most of the fights for conservation have been made to save natural resources belonging to the people which the Interior Department was throwing away. The National Forests must not go the same road.

"Secretary of the Interior Ickes is sincere and honest, but he cannot live forever. Secretary Garfield was honest, but Secretary Ballinger, his successor, tried to give away the people's water powers and the coal lands in Alaska. The resulting scandal cost Taft his re-election. And everybody remembers Tea Pot Dome, when Secretary Fall handed the Navy's oil lands over to the despoilers. Fall tried hard to get his hands on the National Forests.

"Ickes is my friend. Wallace is my friend. But the National Forests could not be better handled in the Interior Department than in the Department of Agriculture, where they have been safe for thirty years. What is the use of rocking the boat?

"The Forest Service is completely free from politics where it is. Ickes, himself is straight, but the whole history of the Interior Department is reeking with politics. The tradition of the Interior Department is to put private interests first. The tradition of the Agricultural Department is to put public interests first.

"Wood is a crop. Forestry is tree farming. It belongs in the Department of Agriculture with all other farming and production from the soil.

"Undoubtedly if Secretary Ickes got the National Forests he would do his level best. But he has more work now than any other Cabinet officer in Washington. The National Forests are bigger than all the Atlantic States from Maine to Virginia, inclusive. Why put this additional load on a man who has too much to do already? Let the National Forests stay where they are."



# FEDERAL ACQUISITION OF STATE FORESTS

By ALFRED B. HASTINGS

*U. S. Forest Service*

A NEW federal forestry policy is beginning to take definite form which may prove of importance comparable to that inaugurated by the Weeks Law in 1911.

The Weeks Law introduced federal acquisition of private forest lands in the East for administration as National Forests. It is now proposed that the federal government aid the states in acquiring land for administration by the states as State Forests.

The proposal is embodied in identical bills known as H. R. 6914 and S. 2739. These bills are based on recommendations drafted by the federal Forest Service and the state foresters jointly. The House Bill, after a public committee hearing, was reported out by the committee and was passed on May 22. No opposition had developed from any quarter at the time of the passage by the House of this measure, and the passage of the law at this session of Congress seemed not improbable.

The purpose of H. R. 6914 is, as stated in the bill itself, "to authorize cooperation with the several states for the purpose of stimulating the acquisition, development, and proper administration and management of State Forests and coordinating federal and state activities in carrying out a national program of forest land management, and for other purposes."

The principal provisions of the measure are as follows:

1. An appropriation authorization of \$20,000,000.

2. A cooperative agreement between the Secretary of Agriculture and appropriate officials of any state for acquiring such forest land as, in the judgment of the

Secretary, the state is adequately prepared to administer and develop as State Forests.

3. Prior approval of all purchases by the National Forest Reservation Commission.

4. Prior provision by law before June 30, 1942 for the reversion of title to the state, or political unit thereof, of tax delinquent lands and for blocking into state or other public forests suitable areas so obtained with preference in the administration of the act to states which provide by law for such reversion prior to June 30, 1942.

5. Preference to states which provide by law for professionally trained personnel employed, advanced, and retained upon the basis of merit. Prior to the statement asserting that such preference will be exercised, the bill definitely states that the state shall make such provisions.

6. One-half of all gross proceeds from all lands purchased will be paid into the federal treasury until by this means or otherwise, the full purchase price (without interest it is assumed), has been so paid, at which time title will be transferred to the State.

7. In the case of lands acquired by the state under tax delinquent laws without cost to the federal government, and included within a State Forest, the federal government, may contribute up to one-half the cost of administration and development of such lands.

The agreement may properly cover, in addition to the business of acquisition, such other matters of importance to the project as are mutually desired by the two parties to the contract and in har-

mony with the act itself. It should presumably authorize the Secretary to acquire land suitable for State Forests and to turn over the same to the state for administration and use. It might set a date before which the total cost would be recovered by the federal government from the state, provide for the passage of title to the state, and specify that no interest would be charged. It might give the state the opportunity to complete the purchase of and secure title to areas in the case of which the related agreement had been terminated. It should no doubt, where applicable, include a pledge that the state would use its best efforts to provide by law prior to June 30, 1942, for reversion and blocking into State Forests of suitable tax delinquent lands. It might provide for the employment of professionally trained forestry personnel. It would embrace the preparation of a plan for a system of State Forests and presumably also detailed management plans for each State Forest unit. It would bind the state, in the case of land acquired by the federal government under the act, to pay for all costs of administration and development, except for emergency federal expenditures for unemployment relief. It would probably include provisions for annual budgets, and for annual state expenditure reports. It would provide for payment to the federal government of one-half the gross proceeds. It would provide for federal inspection. It would provide for termination by the Secretary, at the request of the state, or by the National Forest Reservation Commission after opportunity for hearing, for violation of its terms. The terms of the bill and the agreement have been discussed above at perhaps undue length for the purpose of giving a rather complete view of their provisions.

What is the situation which would be affected by its operation? The National Resources Board Report visualizes a total of 615 million acres of land which should

be under forest management. Of this area 276 million acres should, according to the report, be in federal ownership, 77 million in state, 5 million in county, and 257 million in private ownership. Since in 1934 the actual area of federal forest land recognized was 158 million acres and of state 17 million acres, this means that the federal forest land to be newly acquired would total 118 million acres and state 60 million acres. This proportion of two to one between federal and state forest areas to be acquired was no doubt predicted in part upon the difficulties encountered in speeding up state acquisition programs. If when the report was made the federal government had been actively promoting the acquisition of lands for State Forests, as under the terms of H. R. 6914, it is quite possible that the states would have been assigned a larger area. Taking the figures as they stand, however, two acres of federal forest land to be acquired for each acre of State Forest land, and assuming that the present program of federal acquisition will continue at least through the emergency period, there is pressing need for stimulating the state end of the program.

Beginning with July 1933 there has been unprecedented and gratifying progress in the federal part of this program. Since that date 8,700,000 acres have been acquired or are in process of acquisition at a cost of \$30,000,000, and it is hoped that this excellent progress will be continued. The case with the states is very different. A recent compilation of state acquisition funds available during the biennium indicates a total of a little over \$2,000,000. This, at \$4.00 per acre, would purchase 500,000 acres. At this rate it would take 240 years to complete the purchase of the 60,000,000 additional acres which the National Resources Board recommends. The states have one-half the area to buy and are making available one-sixteenth of the money.

It is evident that something new will



have to be done to even approach carrying out the program of the National Resources Board, which appears to be very conservative in its figures for ultimate areas of State Forests. This new thing may be H. R. 6914.

During the present situation of depression there has been more than ordinary difficulty in getting adequate state appropriations. The federal government has stepped into this breach and federal appropriations for unemployment relief have mounted. If the National and State Forest programs are to be kept in any kind of balance, federal aid to the state programs is essential.

But why this balance? In this country there have developed two great public forest administration agencies, the Forest Service of the Department of Agriculture and the state forestry departments. History has borne witness to the power which has come to the state forestry departments from the Forest Service. State foresters are the first to acknowledge this assistance. Perhaps no less potent has been the strength which the Forest Service has received from the states, although it is much more difficult to measure. There is a mutuality of interest. It is most vital that the aims of both should be broadly the same and that the two programs should be skillfully and fairly coordinated. In the case of State and National Forest acquisition, in fact, the two programs can not both continue without balance, in many cases. For example, in a state with little or no area in State Forests the carrying of a federal acquisition program beyond a certain point may have the effect of making a State Forest program, which otherwise might later develop, impossible. The argument that the situation is being taken care of by the federal government may be all that is needed, by state leaders who are not enthusiastic about State Forests, to kill any such movement.

A balanced program of federal and

State Forests is demanded to carry the load of the public forests which are necessary to our well being. The job to be done may be greater than our combined strength can accomplish in our time. We should, therefore, distribute the load. That part of the public forest area which the states can be induced to administer will be so much weight off the shoulders of the federal government. There is gain to the federal government in dollars and cents as well as in conservation advancement in the assumption by the states of large responsibilities in administration of public forests.

The states have a very real responsibility in carrying a substantial part of public forest administration. Benefits to be derived therefrom come definitely to the state public. Furthermore, the vital problems of tax delinquency, fire control, and regulation of use are fundamentally matters of state jurisdiction and state legislation.

It is of great advantage that any plan for promoting state activity in the development of State Forests shall be backed by the states with enthusiasm and without reservation. For success the states themselves must have their own motors running "in high" on the program. A major objective today is the building up of the leadership of the individual state forestry departments. H. R. 6914 was initiated by the Association of State Foresters and actively promoted by its members. The Forest Service wrote the bill, in full collaboration with the state men, and in this way the measure is off to a good start.

But why State Forests? A state forestry department without State Forests is in somewhat the same position as a farmer without a farm. Certainly the state in its work with owners of forest land is seriously handicapped unless it is working some forest land of its own. The value of State Forests for demonstration purposes is obvious.

The stabilization of industries and of communities is a need which is pressing and generally appreciated. Well selected and managed State Forests are of the greatest value in this connection and might well be justified on this ground alone. Even a single 20,000-acre forest is capable of supporting for all time a fairly substantial little industry and community. One of the most important functions which a well planned system of State Forests would serve is providing a reservoir of employment. In times like these we need not only federal but state lands upon which men can be put to worth-while work, such as developing public forests to the economic and recreational advantage of the nation. There is need today of more State Forests for the CCC.

Every state forestry department has as one of its major jobs the protection of privately owned forest land from fire. The organization for successfully handling this job must be far flung and well trained. The actual work of fire suppression is in most cases limited to short periods, during the fire seasons. A sizeable nucleus of year-long, well trained men is essential. If a state has a well distributed system of State Forests, each unit will serve as a center for the important fire protection job on private land in the vicinity. As an indication of the need for improving our fire protection it is to be noted that of the 417,000,000 acres classed as needing protection from forest fires, only a little over 220,000,000 acres are covered by organized protection to date. Results on the protected areas are encouraging (less than 2 per cent burned

as against more than 20 per cent on unprotected areas), but adequate protection has not yet been reached. The development of State Forests and their adequate protection will advance the protection of surrounding private lands by leaps and bounds.

Then the stabilizing of state forestry departments is a major need which will be accomplished by land ownership as by no other means. There are few things which add dignity and prestige to a state forestry department more effectively than State Forests. Those state leaders capable of checking or advancing state forestry undertakings will be much more likely to view forestry in its true proportions as compared with other state enterprises, if the state forestry department is actually managing considerable areas of land to the advantage of the state and its citizens.

We are just on the verge of great outdoor recreational developments. The ideal plan for supplying this need may be by the wise development and administration of what have been well named "all-purpose State Forests," with the balance between use for timber production and so-called utilitarian purposes on the one hand, and recreation on the other, skillfully adjusted to meet increasing demands for the latter.

H. R. 6914 was introduced in the House by Mr. Fulmer of South Carolina, on March 21. It was favorably reported out of Committee on April 30 and passed the House by acclamation on May 22. An identical Senate Bill, S. 2739, was introduced in the Senate May 1. The measure appears to have gained broad and substantial support.



# NOTES ON RURAL LAND-USE ADJUSTMENT THROUGH A FEDERAL LAND PROGRAM

By MATT C. HUPPUCH

*Resettlement Administration, Washington*

Various national and state agencies acquiring lands for conservation purposes require coordination if a national land policy and program is to be achieved, and if sound steps are to be taken to effect rural rehabilitation. To begin the coordination of these various efforts the Land Program of the Federal Emergency Relief Administration was organized in July, 1934, and the work of this agency is being continued through the Division of Land Planning and Development of the newly organized Administration.

READERS of the JOURNAL OF FORESTRY may already be familiar with Franklin D. Roosevelt's interest in the problem of land utilization, and the steps that he took to meet this problem as Governor of the State of New York. Both federal and state agricultural economists, rural sociologists, foresters, and various planning boards have considered for years the subject of a better land-use policy. This interest and desire for some creative action was immediately felt when President Roosevelt assumed his office.

Many conferences had previously been held, and considerable information collected regarding the seriousness of rural maladjusted land-use. In January, 1934, a Land Planning Committee was organized to study this economic question of rural land-use and to make recommendations for early action. As a result of these recommendations, the Public Works Administration allocated \$25,000,000 to the Federal Surplus Relief Corporation for the purchase of submarginal agricultural land. A Land Committee, composed of Secretaries Ickes and Wallace, Administrator Harry L. Hopkins, and W. I. Meyers, Governor of the Farm Credit Administration, was organized to supervise the functioning of this program through designated coordinators representing the Department of the Interior and Agriculture, the Federal Emergency Relief, and the Farm Credit Administration.

Through the efforts of this committee a program of projects was formulated, consisting of recreational, general agricultural, biological, and Indian projects. In July, 1934, the program of projects was approved by the Special Board of Public Works, and the \$25,000,000 originally allocated for the Federal Surplus Relief Corporation was transferred to the newly organized Land Program of the Federal Emergency Relief Administration, through which all agencies of the government interested in rural land utilization were to act in a program of land-use adjustment.

Under the Land Program it is proposed to develop a limited number of demonstration projects in areas in which the land is generally unsuited to agricultural use, and in which the families now occupying these lands are unable to secure returns sufficient to provide reasonably adequate living conditions even under more normal circumstances.

Fundamentally, the Land Program is concerned with demonstrating uses of land for the greatest public benefit. By emphasizing the proper use of land and natural resources as the basis of a sound agricultural and industrial economy, the Land Program brings a new approach to the correction of social and economic maladjustments of many sorts. As a result of historical, economic, and natural conditions there are areas of declining agricultural lands in many parts of the

country in which standards of living equal the worst conditions found in city slums and where the effects of poverty, disease, and ignorance form an economic liability on town, county, state, and nation. The Land Program plans for the correction of heavy relief burdens of rural communities, high percentage of tax delinquencies, and correspondingly high tax rates, excessive expenses to local governments for the maintenance of schools, and roads in sparsely settled areas. The conservation of human energies, soil, timber, and other resources naturally will receive first attention in undertaking this rehabilitation.

To insure close coordination in the collection of information and the undertaking of suitable projects as demonstrations based on this information, the nine regional directors of the Land Policy Section of the A.A.A. were designated as regional directors of the Land Program, to coordinate the work of the National Park Service, Biological Survey, Office of Indian Affairs, the Agricultural Experiment Stations, and the special consultants on the state planning boards.

During the first nine months of the Land Program 240 projects involving approximately twenty million acres were undertaken in 435 counties. All of these projects were selected on the basis of local, state or national need for the area, the presence of problem land requiring adjustment, the economic status of the population, and the possibility of their rehabilitation through a new land-use economy.

As an example of a project undertaken during the past nine months, I will use a recreational project proposed by the National Park Service and trace its progress through the various stages before it was approved as a demonstration project of the Land Program.

First, on the basis of land studies, a map was prepared for the state, showing

all submarginal or unprofitable agricultural areas which required adjustment of land-use and possessing qualifications for other use; another map was prepared graphically presenting the recreational needs, both urban and rural, but especially the recreational needs of the more underprivileged of the larger urban areas. This map was then super-imposed on the map of the problem land areas, and where they over-lapped investigations were made to determine the feasibility and desirability of undertaking land adjustment projects of a recreational character.

In many cases the need for recreational areas for urban groups and location of problem agricultural land did not coincide, but where they did, there usually presented an opportunity for undertaking a desirable and needed land-use demonstration. Before detailed investigations were started in any project, the state conservation agencies were contacted and agreements secured from them to maintain the areas for the use intended, where administration was not proposed by a federal agency. Project proposals were also submitted to state planning boards for concurrence in or disapproval of plans.

In spite of the warnings to the contrary the relationships with the rural people involved on the projects has been very satisfactory, and the response has been enthusiastic. Many families whose lands have been purchased have been satisfactorily rehabilitated on the project or on other lands, but the slowness of the State Rehabilitation Corporation to function, has left much to be desired in this important phase of the program.

All who are familiar with the Emergency Conservation work know that as a result of that program the technical agencies of the federal government and of the states are working together more satisfactorily than ever before, in the his-



tory of this country. The same thing has occurred to an even greater degree through the Land Program. The Land Policy Section of the AAA, the National Park, Forest, and Soil Erosion Services, Office of Indian Affairs, Agricultural Colleges, County Agents, General Land Office, Federal Land Banks, and others have each to a degree learned of the problems and aims of other agencies, and have learned to cooperate for the common good.

The undertaking of investigations in practically every state and problem land area during the past nine months, required various types of personnel, such as foresters, agricultural economists, landscape architects, architects, recreational engineers, and sociologists, as well as local contact men with vision, initiative, and tact. The professional men were used either in technical positions, as program planners, or in administration capacities, such as regional project managers, state project managers, or individual project managers. Detailed plans on large projects also required technical personnel of the various types indicated. It could be frankly stated that all professions have contributed to the success of the Program so far; even though none of the personnel involved were specifically trained to look at national land planning, from the comprehensive viewpoint required by the policies of the Land Program. It could also be frankly stated that foresters and recreational en-

gineers prepared in forestry colleges, because of their training in land economics, ecology, forest influences, and the necessity for community stability through land returns, were naturally well qualified or readily adaptable to act as project managers, or in other administrative positions, or to act as land planning technicians.

The Land Program was transferred by executive order of April 30, 1935, to the newly created Resettlement Administration, which will no doubt attempt to coordinate still further the various phases of land adjustment and rural rehabilitation. The formation of a satisfactory land policy, and the working out of program planning for our rural areas is a gigantic task. In many cases circumstances require immediate action to prevent further loss of natural resources, and to provide work relief for the hundreds of thousands of families involved. Consequently, the knowledge, contacts, and efforts of the various conservation agencies, federal, state and local, must be effectively used to put men to work quickly on sound conservation projects.

To make the national program effective quickly requires the burying of many special "axes," and an enlarged utilization of the capacities of all professions and agencies concerned. It especially offers a challenge to all foresters whose training and interests should adapt them to orientation, on a national scale without difficulty.

# RELATION OF SITE INDEX FOR SHORLEAF PINE TO CERTAIN PHYSICAL PROPERTIES OF THE SOIL

By T. S. COILE

*Duke Forest, Duke University*

The influence of soil conditions on tree growth is widely recognized, but there is little specific information on these rather complex site factors. The need of measure of the productive capacity of soils which are not now supporting a forest cover, and the possibility of changing the forest cover on certain soils to species better adapted to them, was responsible for the initiation of this study in the Duke Forest during the summer of 1933. The present paper gives a brief summary of the more outstanding correlations observed between certain physical soil characters and the site index of shortleaf pine (*Pinus echinata* Mill.).

THE study was limited to soils derived from Triassic material and their associated igneous intrusives,<sup>1</sup> supporting pure, evenaged, old-field stands of shortleaf pine.

The soil profiles in forty-eight pure, evenaged, shortleaf pine stands ranging in age from 40 to 110 years were examined to determine, if possible, readily observed soil characters that could be associated with productive capacity, as measured by means of the site index.<sup>2</sup> Certain of the physical properties of twelve of these soil profiles which were supporting stands with site indices ranging from 26 to 84, were determined in the laboratory.

Hicock et al, (3) related certain soil characters to the growth of young red pine (*P. resinosa* Soln.) plantations in Connecticut. The stands ranged in age from 12 to 30 years. They found that the character of the subsoil did not have a controlling influence on the site index, but state that "as the trees become larger, the character of the subsoil may exert greater influence." In their study the silt and clay content of the A horizon, above 20 to 25 per cent, showed no correlation

with site index. Colloidal content exhibited only a slight correlation. They found a positive correlation between the moisture equivalent of the A horizon and the site index. In general, they observed fairly good correlations between low site values and low values of the factors in question.

Haig (2) related site index in young red pine stands to the colloidal content of the A, B, and C layers and to averages of combinations of these layers, and to the silt and clay content of the A layer. He found a definite correlation between the site index and these values for the A layer, which were better than similar values for the B and C horizons.

In the present study determinations were made of the following physical properties: thickness of the different soil horizons, complete mechanical analyses, soil porosity, water absorption capacity in the natural state, and volume-weight.

A complete mechanical analysis was made of composite samples from each soil horizon encountered in a 3-foot profile in the twelve stands studied. The method of mechanical analysis was essen-

<sup>1</sup>A part of the Duke Forest is located in the Durham Basin of the Deep River Triassic Area (6) in the lower Piedmont Plateau. The Triassic deposits consist of sandstones and shales of varying texture and color; they are cut by igneous dikes and sills which comprise about 15 per cent of the surface area.

<sup>2</sup>In this study site index was designated as the height attained by the average dominant tree at the arbitrarily chosen age of 50 years.



tially the same as the one used by the Bureau of Chemistry and Soils (5). The porosity of the surface soil was determined by the method used by Auten (1). Samples of undisturbed soil for the determination of water absorptive capacity and volume-weight were obtained by using 5-inch brass cylinders, having a capacity of 600 cc., fitted into a steel cylinder one end of which was bevelled to a cutting edge. The site index of each stand was obtained by comparing the average height and age of dominant and codominant trees with site index curves for shortleaf pine (4).

### RESULTS AND DISCUSSION

The soils studies were all well developed, with three or more well defined horizons. The upland soils of the Triassic area have typically a light textured surface soil and a heavy subsoil. The physical characteristics of each soil layer, considered not alone, but with respect to the other layers are perhaps the most important group of factors that influence the growth of shortleaf pine because of their influence on the availability of water and plant nutrients during periods when soil moisture is low during the growing season. No single soil character of any one horizon was well correlated with site index throughout the range of the site indices studied. Figures 1 and 2 show two typical soil profiles and the stands produced by the two different soil conditions.

From the laboratory studies and numerous field observations it appeared that the site index was influenced by the amount of the finer fractions in the subsoil (B horizon) and by the thickness of the surface soil. These two variables were combined by dividing the silt and clay content of the B<sub>1</sub> horizon in per cent by the average depth from the surface in inches at which it was encountered. The resulting texture-depth index increases in



Fig. 1.—Stand—Open stand of shortleaf pine 71 to 80 years old. Site index 26. Average diameter of the dominant and codominant trees is 7.8 inches. The understory is composed of occasional red gum. The ground cover is made up of silver beard, early goldenrod, and a large amount of reindeer moss with broom moss and white moss.

Soil—Whitestore sandy clay loam. Texture—depth index 31. Parent Material: Fine textured red sandstone.

A<sub>1</sub> Horizon: not present.

A<sub>2</sub> Horizon: (0 to 3 inches). Yellowish brown sandy clay loam, containing 26 per cent silt and 2 per cent coarse sands.

B<sub>1</sub> Horizon: (3 to 21 inches). Dark red, compact clay, which breaks into roughly cubical aggregates, containing 15 per cent silt, and 1 less than 1 per cent coarse sands.

B<sub>2</sub> Horizon: (21 to 36<sup>1</sup> inches). Burnt red, compact clay, containing 39 per cent silt and no coarse sands.

<sup>1</sup>Depth of soil profile.

magnitude with decreases in the depth of the surface soil, the silt and clay content remaining constant; while with constant depth of surface soil, the factor becomes larger with increases in the silt and clay content of the B<sub>1</sub> horizon. In Figure 3, the site index of each stand is plotted over the texture depth-index for the soil



Fig. 2.—Stand—Shortleaf pine 101 to 110 years old, the oldest shortleaf pine stand in the Forest, site index 84. Average diameter of dominant and codominant trees is 18.9 inches. It contains a well developed understory of red gum, red maple dogwood, sourwood, black gum, yellow poplar, sassafras, viburnum, and holly. A few of the red gum trees are 12 inches in diameter at breast height. There is very little ground cover present because of the heavy accumulation of litter and intense root competition.

Soil—Appling sandy loam. Texture-depth index 6.

Parent Material: Acid igneous intrusive rock.

A<sub>1</sub> Horizon: (0 to 4 inches). Dark gray sand to sandy loam, containing 17 per cent silt and 16 per cent coarse sands.

A<sub>2</sub> Horizon: (4 to 12 inches). Pale yellow sandy loam, containing 18 per cent silt and 16 per cent coarse sands.

B Horizon: (12 to 20 inches). Light red to yellowish red friable clay, containing 11 per cent silt and 13 per cent coarse sands.

C Horizon: (20 to 36 inches). Red friable sandy clay to clay, containing 28 per cent silt and 17 per cent coarse sands.

that produced the stand. The optimum texture-depth index is shown to be between four and six. A soil with a B<sub>1</sub> horizon containing 60 per cent silt and clay, and encountered 12 inches from the surface would have a value of five and be of about the highest site quality; however, if the same B<sub>1</sub> horizon is covered with only four inches of surface soil the factor will be fifteen and the site quality will be materially less. Again, if the same subsoil is found 30 inches from the surface the factor will be two and the site quality relatively low. The same type of curve is obtained when the colloidal content instead of the silt and clay content is used; except that all texture-depth values are smaller since only the finer clays, 2 microns and less in diameter are considered colloidal material.

The porosity of the surface soil as measured by percolation rates in the field indicate a rapid rise of site index from 26 to 68 when water absorption increases from 30 to 160 milliliters of water per minute; but with absorption greater than 160 milliliters per minute the site index increased only slightly. Slater and Byers (7) concluded that the field percolation rate of the soil is governed more by the water passageways it contains (root channels or structural cleavages) than it is by the character or volume of the soil mass. The 288 observations made in this study indicate that water-ways formed by soil-animal activity, and decayed roots, are more important in determining the rate of water percolation than cleavage planes and pore space. The soils studied are of relatively light texture and are not necessarily indicative of conditions in heavier-textured soils.

A rather marked relationship was observed between the water-holding capacity of the B<sub>1</sub> horizon and site index; the site index decreasing from 72 to 24 feet as the water-holding capacity of the B<sub>1</sub> horizon increased from 26 to 45 per cent,



while the site index decreases from 72 to 67 feet when the water-holding capacity of the B<sub>1</sub> horizon decreases from 26 to 20 per cent. The association between this physical characteristic in the soils studied and the site index for shortleaf pine is not close in the higher site indices because of the many other physical factors of the soil layers which, singly or in combination, exert pronounced influence on height growth. Variations in volume-weight values were large, and sufficient data to give reliable results were not collected when this study was made.

The size and distribution of roots larger than 0.04 inch were mapped to a depth of three feet in each soil profile. In general the smaller roots (0.04 to 0.4 inches) are concentrated in the soil layer of incorporated humus (A<sub>1</sub>); in the best soils roots of this size class are concentrated in the A horizons. In the soils of low site quality for shortleaf pine (site index 26 to 50) from 40 to 64 per cent of the small roots are found in the B horizon; while in the soils of higher site quality (site index 55 to 84) only 12 to 24 per cent of the roots in the 0.04 to 0.4 inch size class were found in the B horizon. The characteristic roughly cubical structure of the B horizon in the soils of low site quality enable roots to grow relatively deep into this horizon. This may be the result of less mechanical hindrance, and a more favorable carbon dioxide-oxygen ratio during periods of favorable moisture conditions. However, during a considerable part of the growing season the water content of the B horizon is known to be below the wilting percentage in the soils of low site quality.

Density and composition of the under-story in old-field shortleaf pine stands approaching maturity indicate, broadly, the site quality of the soil. In Figure 1 the 71 to 80-year old stand has an under-story composed mainly of occasional red

gum (*Liquidambar styraciflua* L.). Ordinarily poor sites also have red cedar (*Juniperus virginiana* L.), black gum (*Nyssa sylvatica* Marsh), blackjack oak (*Quercus marilandica* Muench.), and post oak (*Q. stellata* Wang.).

The better sites usually have an under-story composed of red gum, red maple (*Acer rubrum* L.), flowering dogwood (*Cornus florida* L.), sourwood (*Oxydendrum arboreum* L., D. C.), black gum, yellow poplar (*Liriodendron tulipifera* L.), red mulberry (*Morus rubra* L.), red cedar, sassafras (*Sassafras variifolium* [Salisb.] Kuntze), viburnum (*Viburnum affine* var *hypomalacum* Blake), and holly (*Ilex opaca* Ait.).

Certain mosses and lichens, including broom moss (*Dicranum scoparium* [L.] Hedw.), white moss (*Leucobryum glaucum* [L.] Schimp. and *L. albidum* [Brid.] Lindb.), *Dicranum condensatum* Hedw., and reindeer moss (*Cladonia* spp.), are associated with the poorer sites.<sup>3</sup> Silverbeard (*Andropogon ternarius* Michx.), and early goldenrod (*Solidago juncea* Ait.) are found extensively on poor sites, but are also found on good sites under open stands.

## SUMMARY

Because of the many physical characteristics and components of each soil horizon, and the presence of more than one

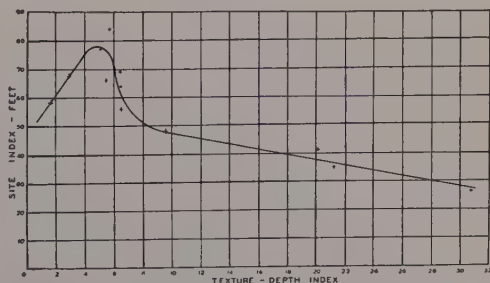


Fig. 3.—Site index as influenced by the silt and clay content of the B<sub>1</sub> horizon, and the depth from the surface at which this horizon is encountered.

<sup>3</sup>The writer is indebted to Dr. H. L. Blomquist of the Botany Department of Duke University for identifying many of the herbaceous plants.

soil horizon, no well defined correlation was obtained between site index and any one physical characteristic or component of any one horizon.

The quotient obtained by dividing the silt and clay content, or the colloidal content, in per cent, of the B<sub>1</sub> horizon by the average depth in inches below the surface at which that horizon is encountered was found to be a reliable measure of site quality for shortleaf pine on the soils studied. The use of this texture-depth index should be of value in determining the site quality for shortleaf pine of soils having a relatively light-textured surface soil and a heavy subsoil located in regions where the rainfall during the growing season is intermittent and prolonged dry seasons occur.

Density and composition of the understory in old-field shortleaf pine stands approaching maturity indicate, broadly, the site quality of the soil. The poorest sites have a very scattered understory of red cedar, red gum, black gum, and black-jack oak; while the better sites will support any of the local species of upland hardwoods, including yellow poplar. Flowering dogwood is seldom found in abundance on the poorer sites, but is a common understory species on the better sites. Certain mosses and lichens are associated with the poorer sites, including broom moss, white moss, and reindeer moss.

The site quality for shortleaf pine can be estimated in the field in broad classes by making frequent borings over the area under observations to determine the average depth of the surface soil and to estimate the amount of silt and clay in the

subsoil. Mechanical analyses are desirable to check the estimate of silt and clay content. With these two values the texture-depth index can be computed and the site quality approximated with reasonable closeness.

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# PUBLIC FOREST FINANCE IN THE LIGHT OF GROWING STOCK CONDITIONS

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In these days of reconstruction when so much thought is being devoted to a better planned social economy, Senate Document No. 12, A National Plan for American Forestry, is a challenge to action in its bold attempt to translate national planning from the realm of theory to that of actual practice in an important and difficult field. No intelligent discussion of public forest finance could have been attempted prior to the assembling of the data presented therein. Whether or not the relatively definite policy advocated in that report is the one which will finally be adopted by the Nation is not of paramount importance. The document makes available the data necessary for the formulation of a number of policies which may serve to meet the situation; and in the following article certain of the facts which have led to the recommendations incorporated in the report are reviewed and alternative proposals for a public forest financial policy suggested.

IT IS believed that, granted reasonable public cooperation as regards taxation, fire protection, and control of production, private initiative can and will organize permanently productive units of forest industry wherever there is a possibility of acquiring forest property which carries a reasonably well-balanced growing stock. The period in the history of this country during which the greatest rewards were to be won by quickly converting natural resources into consumption goods, with no thought for the replacement of these resources, has passed. If the current pressure for liquidation can be relieved, the profit motive should be sufficient to stimulate private initiative so to manage forest property that it will be continuously productive. Any other policy will lead directly to further overproduction, followed by eventual abandonment of private forest enterprise—and no matter how efficiently public ownership can be administered, we should not look toward it as an alternative to private ownership and management of forest property, but only as supplemental thereto.

However, to quote from Hess,<sup>1</sup> "the formulation and execution of a comprehensive conservation policy is fundamentally a government function." Such a policy has been formulated by the U. S. Forest Service in A National Plan for American Forestry (Sen. Doc. No. 12, 73d Cong.). In that document public forest finance is advocated on a scale hitherto undreamed of. Definite recommendations are made as to the total area of forest land that the public should acquire, and budgetary estimates are set up with approximately \$750,000,000, budgeted for purchase.

When watershed protection or recreational activity is likely to be the dominant use, the land should be in public ownership. But when the public interest involved relates to a continuing supply of forest material, it is probable that a large portion of such funds as may be available could more wisely be spent in making it possible for the private forest owner to organize his property for sustained yield management than in purchasing from him areas that he cannot under present conditions manage without following a policy of liquidation, or areas from which he

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<sup>1</sup>Ely, R. T., Hess, R. H., Leith, C. K., and Carver, T. N. The foundations of national prosperity. New York, 1923. p. 162.

has stripped the timber he considers of value.

The 20-year purchase program comprises:

Purchase of 176,000,000 acres in the East at an average cost of \$3.25 per acre.....	\$572,000,000
Purchase of 47,000,000 acres in the West at an average cost of \$1.60 per acre.....	75,200,000
Purchase of 90 billion board feet of stumpage in the West .....	100,000,000
Total .....	\$747,200,000

That the country is today in a critical position as regards the distribution of the remaining growing stock, or forest capital, is evidenced by the diagrams presented in Figures 1, 2, and 3, which are based upon data in the Copeland Report. They indicate that unregulated private management of forest properties has reduced forest growing stock in the East to something less than a third of that required to maintain an adequate supply of timber crops, whereas on the Pacific Coast we have a surplus of growing stock equal to more than twice that which would be required were the forest land of the country as a whole adequately stocked.<sup>2</sup> The program recommends acquisition in the East of 84 million acres of land at present under industrial ownership, distributed about as follows:

Cordwood areas.....	22,000,000 acres
Restocking areas.....	23,000,000 acres
Non-restocking areas.....	39,000,000 acres
Total .....	84,000,000 acres

After completion of this purchase program, publicly and industrially owned growing stock in the East would be distributed approximately as indicated in the diagram shown in Figure 4.

On the Pacific Coast, the purchase of 90 billion board feet would presumably come from old growth timber now in industrial ownership. As the average stand per acre in such areas is estimated to be 36,000 board feet, the 90 billion board feet would be obtained by a purchase of 2,500,000 acres. After this purchase was effected, growing stock conditions on publicly and industrially owned timber land in the Pacific Coast Region would be about as indicated in Figures 5 and 6.

A consideration of growing stock conditions as presented in the above diagrams indicates that the proposed purchase program would not put the public into the business of timber production in any large way as regards the immediate future. The federal Forest Service is already under heavy pressure to manage in a very conservative manner the mature growing stock now existing in National Forest areas, and if 90 billion feet were added to this growing stock in the West, it would probably only be acquired on the understanding that it was to be held for future disposition. The program does not propose the acquisition of any considerable amount of sawtimber in the East. Acquisition of the areas proposed would undoubtedly mean, as the plan states, that half the nation's job of growing timber would be taken over by the public. But this job would be for the future, and private interests would still have the responsibility of handling 90 per cent or more of the growing stock which is now in industrial ownership and which constitutes a very important part of the Nation's forest capital assets.

It is submitted that wise management of existing growing stock is of more immediate importance to the Nation than the rehabilitation of wrecked forest areas. If the minor premise of the report, to the effect that private ownership of forest

<sup>2</sup>The required growing stock as shown in Figures 1, 2, and 3 has been calculated on the basis of the theoretical future growth for the various regions as given in Table 23, p. 232, of the Copeland Report.



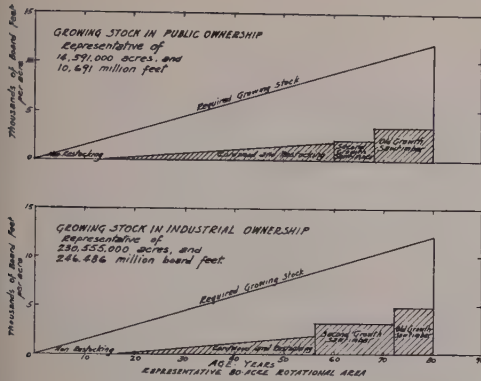


Fig. 1.—Eastern regions.

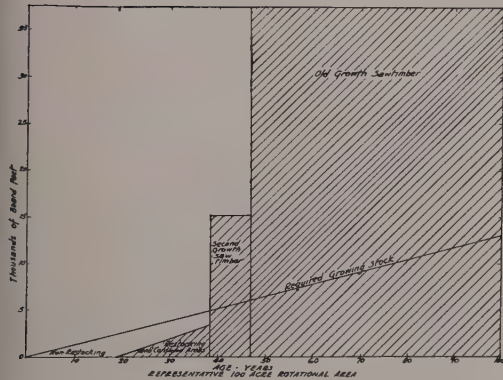


Fig. 3.—Pacific Coast Region. Growing stock in industrial ownership, representative of 27,938,000 acres, and 569,000 million feet.

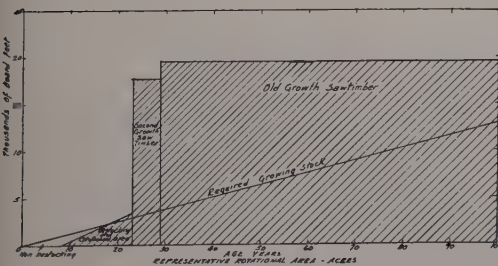


Fig. 5.—Pacific Coast Region. Growing stock conditions if 90,000,000 M feet are purchased by the public. Publicly owned area representative of 36,148,000 acres, and 537,726 million feet of sawtimber.

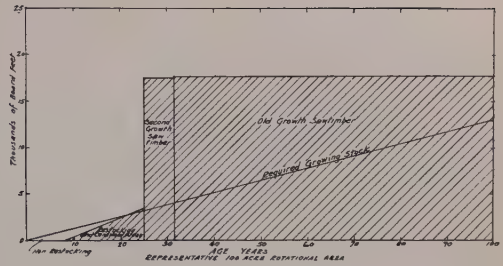


Fig. 2.—Pacific Coast Region. Growing stock in public ownership, representative of 33,648,000 acres, and 447,000 million feet.

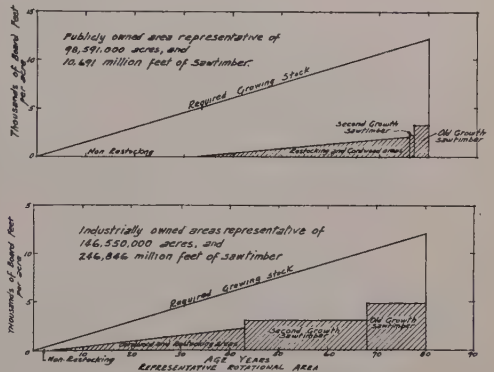


Fig. 4.—Eastern regions. Growing stock conditions if Forest Service purchase program is effected.

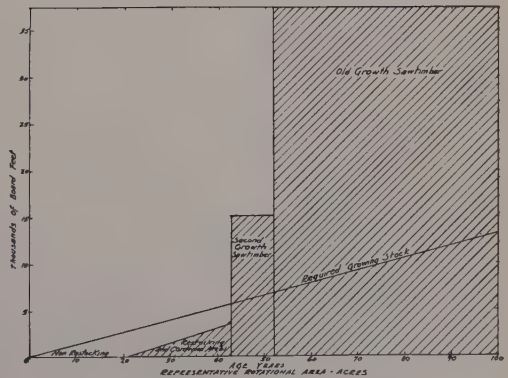


Fig. 6.—Pacific Coast Region. Growing stock conditions if 90,000,000 M feet are purchased by the public. Industrially owned area representative of 25,438 acres, and 478,696 million feet of sawtimber.

land has failed to maintain and develop the values attaching to growing forests in this country, is accepted, it would appear that the plan does not go nearly far enough in attempting to remedy this situation. Admitting that the public should take over and rehabilitate areas where private ownership has failed in the past, should not the public first make sure that while they are undertaking this job, private ownership does not similarly fail in the future and so present the Nation with another, and probably more difficult job, forty or fifty years hence? It is believed that with public cooperation, and regulation if necessary, private ownership will not so fail in the future. A public forest policy should not be adopted until careful consideration has been given to the steps that can and should be taken by the public to attain this end.

There are three major forest regions in this country, the Pacific Coast region, the Rocky Mountain region, and the Eastern regions. Only the first and last of these will be discussed, as the problems which they present press most urgently for immediate action. An attempt will be made to analyze briefly the difficulties confronting private ownership in these two regions and suggest a few of the lines along which a policy of public forest conservation might move to alleviate them.

#### THE PACIFIC COAST REGION

The investment value represented by the 347 billion board feet of timber in the Douglas fir region of Washington and Oregon has been estimated by Col. W. B. Greeley<sup>3</sup> to be \$502,674,500, or \$1.45 per thousand feet. If we apply this value to the 568,696 million bd. ft. in industrial ownership in the Pacific Coast region, we get a total timber investment value of

\$284,000,000. He likewise estimates the investment in sawmill and logging equipment to be \$300,000,000 for the Douglas fir region, and Mr. Burt P. Kirkland<sup>4</sup> using this figure as a basis, places the investment in equipment for the whole Pacific Coast region at \$500,000,000. This brings the total investment value of forest property and allied capital assets in industrial ownership up to \$1,324,000,000 for the region. On the assumption that most of the ownership aims to retire its investments within at least 40 years, and using an interest rate of 6 per cent, the above investment value would call for interest and amortization charges of about \$88,000,000 a year. Liquidation of the 568 billion feet during a 40-year period would call for a cutting rate of 14,200 million per year, and stumpage realization would have to average \$6.20 per M to carry the above indicated annual charges. If, however, liquidation could be effected in twenty years, the annual cut would be 28,400 million and amortization and interest charges \$129,300,000, calling for a realization value of only \$4.56 per M.

The above figures indicate briefly and forcefully the major problem which confronts industrial ownership in the Pacific Coast region, but they do not tell the whole story. Col. Greeley estimates that current charges on the 1926 cut of 10,411 million in Oregon and Washington were as follows:

	Per M
Interest on interest bearing indebtedness .....	\$1.30
Timberland taxes .....	.85
Protection of timberlands from fire .....	.09
Taxes on logging improvements .....	.107
Taxes on sawmills and lumber stock .....	.386
Logging equipment and sawmill insurance .....	.25

<sup>3</sup>Greeley, W. B. The northwest lumber crisis. Amer. Forests 37: 529-533.

<sup>4</sup>National plan for American forestry, p. 914.



Interest on owned capital at 6 per cent .....	3.53
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Total exclusive of depreciation.....	\$6.513
Add depreciation charges.....	1.40

Grand total.....	\$7.91
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It may be held that because industrial ownership of timber property on the Pacific Coast represents a bad investment, interest at the rate of 6 per cent should be eliminated from the above list or at least cut in half, thus reducing the grand total of current charges to between \$4.38 and \$6.14 per M. That such ownership does at the present time represent a bad investment needs no emphasizing, but elimination of constructive interest charges will not alter facts, and pressure for liquidation would still remain the dominant force in the industry.

In the face of the above facts, can it be assumed that the purchase by public agencies of 90 billion board feet and its sequestration for a longer or shorter period will correct or even measurably alter the situation? Such a purchase would save some timber to the public at a relatively low cost, but the investment of the industrial owners would be reduced by only  $7\frac{1}{2}$  per cent. Interest and amortization charges over a 40-year period would still remain approximately \$77,000,000 per year, which is quite sufficient to keep the pressure for liquidation where it is. It is possible that the purchase would represent a good investment for the public, but it will not insure orderly liquidation of the balance of surplus growing stock and subsequent sound management of the regulated growing stock which could thus be brought into existence. The public interest demands that this latter aim be accomplished. If we fail in that, public ownership of an additional 90 billion feet will be but a poor compensation.

#### A MODIFIED PROPOSAL FOR THE PACIFIC COAST REGION

Reference is made to the growing stock conditions on the industrially owned area as depicted in Figure 3. From this diagram it appears that there is a shortage of growing stock on about 38 per cent of the area, with a maximum age deficiency of 18 years. On the balance of the area there is a great surplus, amounting to perhaps 300 billion feet. According to Forest Service figures the production required from this area when all the permanent forest area of the country is in production would be 13 M feet per acre on a rotation of 100 years. With such a rotation in force, and a regulated growing stock, the annual cut would come from mature timber standing on 280,000 acres and would amount to 3,600 million feet. If no age deficiency existed, strict area allotment of the cut on a 100-year rotation would remove the existing mature and semi-mature timber on the industrially owned area during a period of 62 years. Allowing for the age deficiency of 18 years, a period of 80 years is indicated for the removal of this timber and its replacement by young growing stands. Such a program would call for an annual cut at the start of 7,100 million feet, which might be increased slightly during the second half of this cutting period. If production is adequately regulated in other parts of the country little difficulty should be met in marketing such an annual cut, which could be increased at will from supplies of mature timber already in public ownership.

A management program of this nature is one which would, in all probability, best serve public interests. It is equally probable that it would not conform to the interests of industrial ownership when consideration is given to the financial problems in which industrial ownership is at present involved. Especially would this be true if the present policy of a ver-

tical liquidating annual cut were to be adhered to, which would make the annual cutting area about 224,000 acres. Large areas carrying heavy stands of mature timber which are not making any net growth or are even deteriorating would have to be held by private owners for decades. Both from technical and financial standpoints such a program would be unsound.

The alternative is for the same annual cut to be taken from an area twice or three times as great as that above indicated, and thus cover the total area carrying mature timber in from 30 to 40 years instead of from 60 to 80 years. In other words, for the industry to adopt as its standard method of operation selective instead of destructive logging. The advantages of such a policy may be listed as follows:

1. True surplus growing stock—i. e., timber which is already far beyond technical and financial maturity—would be removed in from one-third to one-half the time that would be required under clear-cutting plans.
2. High value stumpage would be removed first, thus more rapidly decreasing both investment and assessment values.
3. Net growth for the area as a whole would commence proportionately sooner.
4. Residual values following logging would be immeasurably higher than otherwise.
5. The whole area would come under management plans fairly promptly, with consequent less risk of loss from fire, insect attack, and disease.
6. Direct operating costs would drop even though capital costs for transportation would rise somewhat, and the net realization per thousand feet of cut should be materially higher.

In view of the above it is pertinent to inquire into the causes which have prevented the general adoption of such a

policy by the lumber industry of that region in its attempts to extricate itself from the financial position it is now in. The following are probably some of the major causes:

1. Lack of appreciation of the possibilities of such a policy and a general lack of any definite plan of management other than to liquidate as and when market conditions permit.

2. An ingrained conviction that quick liquidation is the only way to escape the unbearable carrying charges engendered by over-investment in both timber and equipment, a weak financial position with consequent poor credit facilities, and heavy taxation.

3. The weak financial and technical position of individual ownerships as compared with that which would attach to ownerships which were allowed to merge under adequate public control.

4. The progressive under-valuation of the future which is characteristic of the limited life-span of individuals.

If these major obstacles can be removed from the path of the orderly liquidation of the surplus growing stock, sound management of the required permanent growing stock would result and there will be every prospect for success of the National Plan on the Pacific Coast. The Report probably goes as far as could be expected in making recommendations upon the matters of credit and taxation in view of the fact that they are being given consideration by many public agencies, both federal and state. The fact remains, however, that no national policy of conservation can be crystallized into action which does not adequately deal with these two factors. They are cited as insurmountable obstacles by most operators who see no merit in abandoning a policy of liquidation for one of selective logging and ultimate sustained yield, and they are basic in the way they affect pri-



vate management of permanently organized forest properties.

Removal of these two obstacles might still leave many owners reluctant to embark upon what they consider an experimental method of operation. And the soundness of a general policy of selective logging can be proved only by trying it out on an extensive scale. To do so on a basis equal to the need, it would appear necessary for the public to:

(1) Authorize legislation which will permit the merging of industrial ownership units for the purpose of blocking up technically practicable management units and the elimination of unnecessary logging and milling equipment, and

(2) Guarantee to purchase from individual ownership units, that cannot so merge, any areas which have been cut over under approved management plans and which it is financially impossible to carry until a second cut is both feasible and in the public interest.

It is suggested that the utilization of public funds for the acquisition of properties from which the dead weight of over-mature non-productive timber has been removed, even though such a purchase program has to extend over a long period of years, would be a sounder public investment than the acquisition of any body of timber which is static as regards growth and which thus constitutes a mere hoarding of timber wealth against the time of some possible future timber famine. Such a purchase program would result in acquisition by the public of two to three times the future timber supply which could be obtained by an equal expenditure of funds for the purchase of a portion of the old growth saw timber now in industrial ownership. Moreover it would remove the objection of so many individual owners that they cannot subscribe to a plan of management which ties up their resources far beyond the time when they can themselves realize upon

them, and so would be a powerful incentive to orderly regulation of growing stock instead of hasty liquidation.

### THE EASTERN REGIONS

The problems presented by the growing stock conditions on industrially owned forest land throughout the Eastern Regions are, for the most part, the direct opposite of those existing on the Pacific Coast. Over very large areas liquidation has run its course, leaving bare or sparsely restocking lands in its path. The ratio of present growing stock to that required to maintain reasonable timber supplies varies from less than .3 in the Lake States to possibly as much as .9 in New England, but is certainly less than .4 for the average of the industrially owned areas in all the Eastern Regions. The major problem is therefore that of building up growing stock to more than double its present amount.

This the plan proposes to do for a total area of 176,000,000 acres, but for only 84,000,000 acres, or about 36 per cent of the area now in industrial ownership. This is an objective which is well worth while; but again it would appear to be of secondary importance as compared with measures which would lead to the maintenance of the existing growing stock in a productive condition. The saw timber areas industrially owned in the Eastern Regions total 67,451,000 acres and carry a total stand of 246 billion board feet. It is entirely possible that while public agencies are rehabilitating 84,000,000 acres so that they can be counted upon for timber supplies fifty or sixty years from the present, a large portion of this growing stock, which is currently capable of sustaining an annual cut of between 10 and 15 billion board feet, may be wiped out. The Nation would then be in approximately the same position as regards potential timber supplies throughout the Eastern Region as it

is today, but would have spent vast sums in rehabilitating areas on which the growing stock is at present in a wrecked condition. To adopt such a plan would be to admit that private forest enterprise must inevitably fail and should be permitted to fail. Were it true that there is no hope of successful private forest enterprise in the East, it would certainly be wiser for the public to invest such funds as may be available in our remaining manageable growing stock, rather than in cutover and restocking land.

A tremendous area of this class of land is forcing itself into public ownership at the present time. It is more than probable that such land as cannot in any event escape public ownership will constitute as large an area to be completely rehabilitated as the public will find funds to finance and technical skill to manage. No plan which does not take steps to shut off at the source this flow of wrecked forest areas into public ownership can be considered adequate.

#### MANAGEMENT PROBLEMS IN THE EASTERN REGIONS

The obstacles in the path of organization of private forest property for permanent production in the Eastern Regions arise more from diversity of ownership than from any excess of merchantable timber in the hands of individual owners. In very few cases do private owners hold a timber property which could be immediately organized for permanent production. Most properties are now being operated under plans which look toward liquidation; and if the owners plan on remaining in the business of timber production, such plans are usually based on the acquisition of additional timber properties rather than upon a second cut from present holdings.

Thus in the Lake States the average life of existing sawmills is estimated to

be only about eight years, as based upon normal annual cuts and the merchantable timber tributary to these mills. When the available cut for these mills is exhausted, the owners will cut their losses, as far as possible, and may seek to re-employ the capital thus released in timber ventures in other parts of the country. In the South it is unlikely that the life of the average mill, based on merchantable timber directly tributary to it, is greatly in excess of that in the Lake States, although due to the very much larger area and greater volume of timber in that region, there are doubtless some operating units which have a very much longer prospective life. In the Central, Middle Atlantic and New England Regions smaller operating units have been the rule and there is, on the whole, a better balance between the conversion capacity of logging and milling equipment and the productive capacity of the timber properties which support it. Nevertheless it is a fact that only a very small percentage of the ownership units in the Eastern Regions have any such balance between the productive capacity of the timber property and the conversion capacity of the owned plant and equipment, as is likely to induce the owners to organize for permanent production because that appears to them to be the best business policy.

It is possible to demonstrate that when conversion capacity is properly balanced against the productive capacity of a timber tract, organization for permanent production is the soundest policy both from technical and financial standpoints. If such is admitted to be the case, it is again pertinent to inquire into the causes which have prevented more general adoption of plans for permanent production by operating timber owners in the Eastern Regions. Again we will find the same major causes militating against such practice.



It is probable, however, that in the Eastern Regions, due to the fact that the average owner is not carrying a burden of excess investment in timber and operating capital comparable to that carried by the average owner on the Pacific Coast, the first two causes, namely inadequate credit facilities and burdensome taxation, are not relatively so important as are the prospective shortage of merchantable timber to keep mills operating and a general unwillingness to believe in or plan for the future. This is not to say that the revision of taxation of forest property and the extension of credit facilities to operators who plan to organize for permanent production is less important in the Eastern Regions than on the Pacific Coast, but it is believed that such obvious remedies will be relatively less effective in the Eastern Regions than in the West. Likewise, it hardly seems possible that public acquisition of 34,000,000 acres of cut-over and restocking timberlands now in industrial ownership would of itself, even though accompanied by equitable taxation and adequate credit facilities, insure sound management of the millions of acres of sawtimber lands by the very diversified types of ownership which control these areas.

The opportunity to consolidate timber holdings in the Eastern Regions is every bit as necessary as in the West, but the possibility and incentive for such consolidation are much less obvious. Large blocks of untouched merchantable standing timber in the hands of a few owners are of rare occurrence in the Eastern Regions. The best merchantable timber is either relatively inaccessible or is owned in relatively small blocks by a large number of owners. Consolidation into units which would permit organization for successful permanent production is perfectly possible, but is not likely to be accomplished because of diversity of interests and lack of leadership. Undoubtedly such consolidation leading to the organization

of permanently operated management units would be in the public interest, and again it is suggested that the public can well afford to underwrite a policy which would lead to such organization.

#### MODIFIED PROPOSALS FOR THE EASTERN REGIONS

In view of the scattered ownership conditions in these regions it will be necessary for the public to take the initiative in any development of a permanent timber industry which is based upon the productive possibilities of existing growing stock. Otherwise it is quite possible that public agencies may be forced to develop such an industry from the ground up—an infinitely more costly procedure. Two main ways in which the public may move to take this initiative have been proposed:

- (1) By building up management units through the direct purchase of timbered areas, selectively cut lands and restocking areas, which are now in scattered ownership and therefore unlikely to be consolidated into successful management units.

- (2) By organizing government-financed corporations to acquire such timbered and restocking lands and to manage these areas as single management units.

The first method is similar to the acquisition plan proposed for timbered areas on the Pacific Coast and has been advocated as a sound policy for the public to follow in the Eastern Regions by a number of people who have given the matter serious consideration and particularly by Mr. R. B. Goodman of Marinette, Wisconsin. A tentative scheme for giving effect to the second method has been drafted by Mr. D. R. Brewster of Memphis, Tennessee. Both methods have certain merits and it is quite probable that it may be desirable to employ both in various places in these regions.

If such management units were built up as public enterprises, taxes would not enter into the costs of operation and the public would recoup itself for loss of tax revenues on the areas during the period of development as and when surpluses began to appear. If private initiative is expected to handle such properties the public must similarly be willing to forego its tax revenue until the properties are on a paying basis. This would be the

same as extending further credit to the enterprise. In effect the public would go into partnership with the private corporation by investing its tax equity instead of owning and managing the property directly. When one considers the rate at which cut-over lands are reverting to public ownership for non-payment of taxes it would appear that this is a phase of public forest finance which is worthy of attention.



#### STATE SCHOOLS WILL TEACH GAME MANAGEMENT METHODS

Courses in game management to be set up in several state universities, will have the active support of the Bureau of Biological Survey, which is prepared to supply instructors and to cooperate with the universities and with state game commissions in financing this new development. One of the leading American manufacturers of arms and ammunition has agreed to contribute \$30,000 a year for the purpose. The Biological Survey will be able to supply \$42,000. The game commissions and universities also will share in the expense.

Under this new policy the Biological Survey will supply the educational institutions with technically trained instructors who will make available to students, farmers, landowners, and sportsmen the results of investigational and experimental work conducted by the wildlife agencies of state and federal governments and by conservation organizations.



# THE STUMBLING BLOCK OF FORESTRY

By RAYMOND J. HOYLE

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SHELTER belts from the Panhandle of Texas to the Canadian border, land acquisition for forestry purposes to the extent of 224 million acres, indications that the federal government may go into the business of logging, saw-milling and merchandising of lumber, and Civilian Conservation camps with the possibility of a greatly expanded program, are some of the momentous projects which will have a very significant influence on the forestry profession, not only for the next few years but for generations.

Are these programs carefully thought out? Where will they lead us? Are they the best and only solution to some of the problems which they aim to solve? What other solutions have been offered and rejected as valueless? These are some of the questions that come to one's mind as the New Deal wheel is spun again and again.

Work relief, and social and economic reconstruction and rehabilitation, whatever the latter may be, seem to be the most sound reasons advanced for justification of this new forestry program. In these trying days, one does not wish to be too critical or to be an obstructionist. On the other hand, policies and programs that are being rapidly formed and suddenly handed to the forestry profession and the taxpayer should have a thorough discussion in order to evolve the best possible results. Too many conclusions that may not be well founded seem to have been suddenly reached.

Three, four or five dollar an acre forest land may be called a good federal, state, or local government investment. These proposed large public ownerships

will stabilize industries and communities. Shelter belts will do several things, some of which seem almost magic. The federal government in its proposed logging and milling operations will make the business of forestry more complete and the conversion of timber more satisfactory.

These and other assurances may be true but there is ample evidence to indicate that such may not be the case, and that much of this procedure may not be desirable. These new programs are said to be an improvement over forestry practices under private ownership. Most of us know that private ownership has often resulted in forest destruction, but where does the fault lie and is government ownership and activity in manufacture the best solution? A certain amount of limited government ownership for protection, demonstration, historical and park purposes is desirable, but large ownership is a hasty and radical departure if not a method of avoiding the real problem. The CCC program has done a fine thing for American youth as well as the improvement of forest areas, and in general meets with approval.

Most foresters will agree that the U. S. Forest Service has in the past done a splendid piece of work, but as this branch of the government becomes older and enlarged, one wonders what turn it may take. Politics intimately tied up with certain undesirable elements and factors may do strange and unsound things with county, state or federal forests in a twinkling of an eye or the stroke of a pen. A long list of facts showing miscarriage of justice and inefficiency in government, as well as extravagant, uneco-

nomie policies, would be easy to relate. Such an illustration would be the cotton, wheat, oats, corn, and hogs program that is costing huge sums of money to increase the cost of clothing and food, while at the same time the taxpayers are required to pay tremendous expenditures to reduce the costs of electricity. Other illustrations could be given in our deplorable tax system, or our unethical and extravagant county government. Knowing of the past and present performance of government, who can help but wonder what undesirable results may come from the present activities and trends in forest policy?

Not many years ago the federal government made the grave error of disposing of the public domain. Now it suddenly decides to buy much of it back. May we not again be making a grave error? Would it not be more admirable, practical, and helpful for the government to make an honest attempt to regulate and assist private owners than to buy lands and forests and even threaten to go into the logging and lumber manufacturing business?

Government policies may be very satisfactory for a time, but there is no reason to doubt that policies that might be very adverse to forestry and industry could result almost overnight. Let us not forget the great opportunities government ownership offers to political spoilsmen. Let us not forget our unjust system of taxation, about which practically nothing is being done and of which no improvement is seen. Let us remember that forest taxation is one of the big handicaps to forestry and that it is about as unfair as ever, in spite of the forest taxation inquiry. What has government done to make private forestry pay? Free advice, free bulletins, free seedlings or seedlings at cost, some encouragement in protection, practically no tax relief, and, last but not least, practically no help in marketing.

Turn to the marketing activities bulletin issued weekly by the Department of Agriculture and note the interest and money that is going into marketing activities in agricultural pursuits. Think of the vast amount of money that for years has gone into the work of the many agricultural experiment stations and the army of county agricultural agents. The agricultural problems are receiving attention, and properly so, but what comparable work is the forestry problem receiving? If the reader is interested in details and exact figures, they can be found in the financial statements of the annual reports of the Secretary of Agriculture and the Forester. Some very interesting trends can be seen in the last five years. Space here permits of only a few of these statistical comparisons. The 1931 report of the Secretary of Agriculture states that the federal government contributes annually about \$4,500,000 to the experiment stations, whose total funds for this work alone are approximately \$18,000,000 annually. In 1931 the total Forest Service expenditure for all purposes was \$35,877,808, in 1934 it was \$75,984,669. During this same interval the research figure increased slightly, from \$1,783,362 to \$1,898,436. The increase from 35 to 75 million dollars seems to be found chiefly in roads, trails, construction, improvements, equipment, and stores. The rapidly enlarging programs of the CCC and of forest land acquisition will increase the expenditures for forest growth and improvement many millions of dollars. Appropriations for forest products work are not increasing, while acquisition and forest improvement are making great strides. Forestry is something more than growing trees, and it is something more than land acquisition. Forestry must recognize the necessity for efficient marketing and use of the timber and must attempt to understand and solve that problem, before it will be fulfilling its obligation. Forestry needs



a vast amount of technical and market research.

The markets for forest products are drying up. Wood is being replaced in almost every use. Trends indicate that small amounts of low quality cellulose may serve where large amounts of high-grade lumber were once used. What is being done in addition to the work of the Forest Products Laboratory, which is altogether too little, to make wood a more desirable and satisfactory product so that it will continue to be in demand? Wood must be made rot-proof, bug-proof, shrink-proof, and fire-proof at an economic price, or many more of its markets will disappear. The lumber industry is faced with high, unjust taxes and disappearing markets and competition between thousands of producing units. The competition from farm woodland products is great. It is unorganized and generally uneducated in the business of managing and converting timber into money. Farm woodlands represent one-third of the forest land acreage east of the Rocky Mountains. Very little has been done that will result in better management of this vast area, and practically nothing has been done to assist the owner in marketing this material.

The products of the farm woodland in the United States amount to 24 per cent of the total wood volume. Twenty-one per cent of the merchantable timber removed each year in the United States comes from farm woodlands. In states east of the Rocky Mountains, these percentages are two and three times as great. Think of these figures for a moment and note that these woodland products are bringing the owner little or no profit, and that they are put onto the market in a way and at a price that generally results in tending to demoralize markets and defeat forestry. The farm woodlands are a thorn in the flesh of the lumber industry and forestry practice, yet in spite of

whatever little may have been done forestry is not being practiced, and the marketing of the products is extremely inefficient. Forestry will never be practiced satisfactorily on woodlands until the owner can sell the products at a profit.

The Lumber Code has probably done many good things but at this point an observation in a recent lumber journal is pertinent. The writer said: "During the past year the Lumber Code has cost the industry \$6,000,000, and this money was used to finance an astringent program of self-destruction while one-tenth of that sum spent on an intelligently conducted advertising program would have brought the same kind of prosperity that it did for the automobile manufacturers." Whether or not all of this statement is accepted, there is a great deal of truth in it. When one notes the vast sums of money being spent for forest land acquisition, reforestation, and forest improvement, and the negligible sums being spent for marketing and use of the timber, it is evident that millions are being spent for production and pennies for markets. This is the best answer to "What Ails Forestry."

Why not get at the heart of the matter rather than take the spectacular method of government in business? This article does not attempt to hold any brief for the moneyed interests or any other group. What it does attempt to indicate is that foresters should accept the problems of forestry as something more than timber growing and that they should not throw up their hands and say that the only way to solve this problem is by large public ownership. Farmers have caused great damage by drainage and destruction of soil fertility, but the government has not attempted to solve the agricultural problems by buying up farms on which it will raise and market its crops. Neither is the government buying good farms, thus making competition with other

farmers greater. Why is forestry not approached from the same angle?

This country needs several forest products laboratories doing technical and market research. Wood, the most widely used of all heavy raw materials, is the least understood and the most poorly merchandised. The federal government, with its large timber ownership, should consider this point from its own selfish interest, if nothing else. The success and progress of forestry is coordinate with the progress in technical and market research. How much longer are foresters going to dodge the issue because of their lack of knowledge? How much longer is this stumbling block going to remain in the path of forestry?

Before the forestry profession and the federal government decide that private forestry will not give us desirable forestry in this country, the entire field of forestry and its many problems should be analyzed, properly balanced, and coordinated. The timberland was originally almost dumped into the lap of the private owners, with a blessing, and now follows a condemnation. Is the government now doing the right thing in attempting to correct a situation that dates from this earlier land policy? Is the present land acquisition policy sound?

It is recognized that the government should be vitally interested in the care and protection of natural resources, and that rugged individuals should not be allowed to abuse their rights. Toward this end, Article X of the Lumber Code

appears to have good possibilities for making private forestry practical. Sufficient time should be given to work out the problems of the Code and to show whether it will give the desired results or not. These problems must be approached with a mild, sympathetic attitude. There must be regulation and coöperation of all timber owners, at least in some degree, because exploitation of timber by any group would result in unfair competition and forest destruction. The lumber industry should meet its responsibility with a sincere, tireless effort.

Can we feel assured that the government has done all it could or should do for the farm woodland owner or the large timber owner? Do foresters recognize the important and inseparable relation between production, manufacture, marketing, and use of timber and thus attempt to approach the problem with a complete, non-prejudiced picture before them? Has the government made an honest attempt to assist and regulate so that better forestry may be practiced? Knowing government from past performances, what assurances do we have that under its large ownership conditions will be desirable? May we not properly ask that the government give private forestry every opportunity possible? Forestry needs assistance and not the un-American method of large government ownership. Are foresters going to surrender their problem to government ownership, or are they willing to recognize their problem in its broad aspects and support it? An opportunity awaits our young profession.



## A REJOINDER

By WILLIAM N. SPARHAWK

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PROFESSOR HOYLE, like some other critics of public forest policies, appears to see the trees but not the forest. His argument is based entirely on forestry for commodity production, and ignores completely the multiple functions and services which make forest conservation so much a matter for public concern.

Omitting matters not relevant to forestry, his paper may be boiled down to two main theses:

1. The extensive program of public forestry advocated in the Copeland Report and elsewhere in the last few years is suddenly conceived, radical, and un-American. It probably will become enmeshed in politics and in any event is less likely to bring about real forestry than would removal of the stumbling blocks that are preventing the practice of forestry by private owners.

2. These stumbling blocks are: Unjust forest taxation; competition in the sale of forest products, particularly those from farm woods; and, worst of all, the failure of foresters and the government to carry on "technical (*sic*) and market research" and by advertising and discouraging the use of competing materials to create such a demand for wood that whatever may be grown can be sold at a profit.

As to the first thesis, let us look at the record. The policy of permanent public ownership and management of forests is not suddenly conceived, radical, or un-American. It has been developing gradually in this country for 50 years, beginning with New York's reservation of the Adirondacks in 1885. The establishment and administration of State and National

Forests have been supported by the most respectable people, including many 100 per cent Americans, just as zealously as by the wildest radicals. Republicans as well as Democrats have sponsored the policy of public forestry. The law creating the National Forests was signed by Benjamin Harrison; that providing for their administration and utilization, by William McKinley; the Weeks and Clarke-McNary laws, providing for federal acquisition of privately owned forests, by William Howard Taft and Calvin Coolidge, respectively. Radical? Un-American?

Because some government agencies have done things that he does not approve of and because there have been instances of injustice and inefficiency in government, Hoyle expresses doubt as to whether the bogey-man may not sooner or later capture the Forest Service. He asks: "On the basis of past and present performance, what can be expected of government in the future?" but admits that the Forest Service has done a splendid job. Can as much be said for private forest enterprise?

Throughout the 50 years during which public forestry has been developing—and for 250 years before that—private enterprise has had the opportunity to show what it can and will do. During most of the period consumers were clamoring for lumber and other wood products; taxes were nominal; wood was not suffering seriously from the competition of other materials. The alibis of unjust taxation, competition of substitutes, and lack of markets had not been thought of. Instead, it was asserted—and no doubt believed just as sincerely as the more

recent alibis—that the timber supply was inexhaustible; that conservative handling of the forests was not necessary and would not pay until some distant future, after the virgin timber had all been cut.

Increased demand and good prices for timber products did not stimulate forestry practice, but only resulted in heavier cutting and more serious depletion of the growing stock. The wealth and the wealth producing capacity of wide forest areas were virtually wiped out, and many millions of acres of forest land were left in such a condition that they are no longer attractive to private enterprise.

If we look at the situation realistically, we must recognize that a very considerable portion of the forest land of the country simply will not remain in private hands, unless the owners are relieved of all the obligations and responsibilities that go with ownership. Large public ownership is coming, whether we plan for it or not. If we accept the defeatist view that the demand for timber is bound to remain at a low level or to decline still further, we must be prepared for a much larger public ownership than has yet been proposed.

So far, there has been no disposition on the part of foresters or the government to "surrender their problem to government ownership." The programs proposed by the Copeland Report and by the National Resources Board leave more than 250 million acres of commercial forest in private ownership. According to the latter report: "Economic factors fix certain limits of forest productivity and value below which private initiative cannot realize adequate returns from properties managed with full regard to the public interest. Where that condition prevails, public ownership is dictated. . . . The forests recommended for private ownership are the areas on which private enterprise appears to have the best chance to make a profit out of forestry."

Now let us look as the "stumbling

blocks" which the government is called upon to remove.

Forest taxation is too involved a subject to discuss here. Suffice it to say that the effects of existing systems of taxation are the most serious in the case of non-operating forest properties held for speculation, and properties where the growing stock has been so depleted that appreciable income will be deferred until the more or less distant future. In the case of forests operated on something approaching a sustained-yield basis the tax burden is no more and possibly no less serious, on the average, than the burden borne by other forms of enterprise in which a large part of the investment consists of real property.

It is stated that farm woodlands are a thorn in the flesh of the lumber industry, because the farmers are not practicing forestry and are selling their products at low prices. Of course, farmers are not the only offenders in these respects. In any event, two alternatives seem to present themselves: (1) Let the farmers continue their evil ways and they will soon eliminate themselves as competitors, for they will have no more good timber to sell; (2) through education, public assistance, or some kind of regulation induce them to hold their timber off the market so that industrial owners can market theirs. If this should result in higher prices, as seems to be intended, it might tend to reduce the demand for wood. From the public standpoint it is difficult to see what would be gained, in the absence of assurance that industrial owners would handle their woods better than the farm woods are being handled. It is a fairly safe bet that fully as good forestry is being practiced on farm woodlands, taken as an aggregate, as on the aggregate of industrial and speculative holdings.

It is true that forestry, even from the standpoint of commodity production alone, is more than growing trees. Of

course there must be a market for timber products if private owners are to engage extensively in forestry. Without such a market, even public forestry cannot continue to afford the employment opportunities that are essential to the permanent existence of thousands of communities.

Probably no forester will disagree with the thought that the public should do much more than it has done to help both farmers and industrial owners to market forest products efficiently. It can hardly be expected, however, that governmental agencies should attempt to persuade or compel consumers to buy inferior and unsatisfactory products, or even better materials, at prices which will yield a profit to the producers no matter how inefficient their production methods. Hoyle says that forestry will never be practiced satisfactorily in woodlands until the products can be sold at a profit. Perhaps it is equally true that owners will not be able to make satisfactory profits from their woodlands until they practice forestry. It is reasonable to believe that timber can be grown much more cheaply, and it is certain that timber of better quality can be grown, by the application of good forest practices than without them.

Another point should be kept in mind. For the government to attempt to promote the use of wood by discouraging the use of other materials would be a species of meddling in business which would rightfully be resented by the producers of such materials. They are just

as much entitled to public assistance in maintaining and expanding their markets as are the producers of timber. It is not a proper function of government to play favorites by helping one branch of the national economy at the expense of others.

Technological and marketing research and advertising will all help to create and maintain a demand for forest products. They will be of little avail, however, even if competition can be stifled, unless the forests are so handled as to yield the kinds of materials that are best suited to meet consumers' wants, at prices which consumers are willing to pay. Moreover, there must be some assurance that such materials will continue to be available in sufficient quantity and at reasonable price. It is even conceivable that timber products might in the long run find readier acceptance by consumers if cut from well-managed and well-kept forests than if obtained only by wrecking the landscape.

The time has not yet come, nor is it likely to come, for us to slacken our efforts toward bringing about more efficient timber production and to concentrate them on utilization and marketing. If the lumber and other forest products industries are to continue as important factors in our national economy, they must have raw materials in ample and continuous supply and at prices low enough so that they can make a profit. If private land owners will not provide this supply, the public forests must, or the industries will cease to exist.



# VALUE OF WATERSHED COVER IN FLOOD CONTROL<sup>1</sup>

By SAMUEL B. MORRIS

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IN the limited time at my disposal in the preparation of this paper, I have been unable to analyze much existing data, nor to present any original data upon this subject which is of such great economic importance to the citizens of Southern California. In fact there is a decided dearth of adequate or convincing data upon the general and detailed effect of watershed cover on streamflow.

This lack of information upon such an important problem has led the U. S. Forest Service to inaugurate a most elaborate, intensive, and prolonged study of rainfall, runoff, and erosion in the Dalton and San Dimas drainages, under conditions of known and controlled watershed cover. This is an experiment which must gladden the heart of every engineer and forester interested in this field of research. Less than three weeks ago I was privileged to spend two days in inspection of these test watersheds and the equipment for this research in company with Dr. W. C. Lowdermilk and Mr. Don Sinclair, and I therefore know the treat that is in store for you on tomorrow's field trip. Upon completion of the 30-year study of the Dalton-San Dimas watershed experiments, an authoritative statement upon the subject of the value of watershed cover in flood control should be possible. In this paper, I can merely state some of the problems.

Here in Southern California we are confronted with a vastly more severe flood control problem than most of the citizens of this metropolitan area recog-

nize from their brief residence here. It is now nearly 20 years since the last major floods in 1914 and 1916, during which time our population has trebled from the influx of families from other states. These later years have been years of deficient rainfall, and conservation of water has received the attention of the public rather than the protection of life and property from flood damage.

The intense rainfall of December 31, 1933, and January 1, 1934, particularly its effect upon the recently denuded mountain area affected by the Pickens Canyon fire, caused such loss of life and destruction of public and private property in the Montrose-Glendale area as to focus the public attention upon the value of forest cover in flood control. The destruction caused by the swollen, silt laden, boulder carrying streams from the burned areas, in comparison to lack of abnormal streamflow from the unburned areas were sufficient to convince both engineer and laymen of the great protection afforded by the native brush cover. The comparisons were so eloquent as no longer to leave the observer in doubt, in spite of the many reports and papers which have been written from the time Col. H. M. Chittenden published his paper in 1909 upon the subject of Forests and Reservoirs in their Relation to Stream Flow with Particular Reference to Navigable Rivers, in which, you will recall, he found that streamflow was not affected by forests, down to the paper by W. G. Hoyt and H. C. Troxell followed by the

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<sup>1</sup>Presented at the annual meeting of the California Section of the Society of American Foresters, December 7, 1934.

discussion of 20 engineers and foresters in the 1934 Transactions of the American Society of Civil Engineers.

There is always danger in generalization or in extension of observations beyond the values or conditions actually observed. And so we should be particularly happy that the test areas are located in the Dalton-San Dimas drainage areas in the midst of our local mountain drainage problem. The results obtained should be easily extended to the other drainage areas of this semi-arid mountainous country of the southwest.

Now let us observe the nature of our local flood control problems. We have a region of relatively large mountainous drainage areas extending up to a maximum elevation of over 10,000 feet, from which streams emerge onto debris cones in densely populated and improved valley areas, and thence in winding river channels discharge their flood water in decreasing gradients, until the sea is reached in a distance of 40 to 75 miles from the mountain peaks.

In past geologic time these uplifted mountain blocks have been eroded and transversed by deep canyons. The products of erosion have filled the valleys of the depressed blocks. These forces of erosion of the mountains and deposition in the valleys is still going on. Any policy or program of flood control must take these matters into consideration. In the relatively short period of rainfall and runoff records we have observed sufficient storms and floods to give us some yardstick to the intensities of rainfall and of flood discharge, to be met.

Flood control works consists essentially in (1) storage of flood peaks followed by release at rates which will not cause damage, and (2) by desynchronizing of tributary streams by retardation of some branches and by accelerating others, (3) by maintenance of adequate stream or river channels with adequately protected gradients and revetted banks or dikes, and

(4) by elimination of habitation or valuable improvements in areas subject to excessive damage by flood water.

Let us consider the part which forest cover should play in this program of flood control.

(1) In the matter of storage, watershed cover is an important factor. In all ordinary storms the native brush and forest cover is effective in retaining the soil on the mountain slopes, and in releasing water from the canyon mouths partially controlled and without excessive silt. However, in the event of the prolonged excessive storms which may occur on the order of once in a hundred years, we can expect great floods from the forest and brush covered areas only slightly reduced in volume of flood flow by the native cover. It is likely that the character of rock and the depth of soil covering have a very material effect upon the quantity of water which may be retained by the watershed during an intensive storm. Naturally a region of thin soil covering and hard tight rock would soon absorb its capacity of water, and all additional rainfall would run off with little or no benefit from the forest cover. But should the cover be destroyed, we can expect greatly increased quantities of silt and debris including large boulders to be carried by the mountain streams.

The example of Gibraltar Reservoir of the Santa Barbara City water supply demonstrates silting due to burning of brush cover. This reservoir with original capacity of 14,000 acre-feet has silted up to the extent of 4,100 acre-feet or 28 per cent of its capacity in 13 years. Upon this basis the Gibraltar reservoir will be completely silted up in a period of 46 years after its construction. Of the 217 square miles of drainage area, 150 square miles or 69 per cent has been burned over in these 13 years. The fire of 1933 burned over 45 square miles. Upon this basis the average erosion for 13 years has been at the rate of 2,350 cubic yards

per square mile per year. The Los Angeles County Flood Control District has observed rates as high as 50,000 cubic yards per square mile in the Pickens Canyon area.

We have all heard of the tremendous quantities of silt carried by the Colorado River amounting to 137,000 acre-feet per annum. If no other storage is provided this will fill the great Boulder Canyon Reservoir of 30,500,000 acre-feet completely in a period of 222 years.

And so we can expect all of our high dams eventually to be so silted up as to lose their effectiveness as flood control storage units. Preservation of the watershed cover will prolong the useful life of such dams and reservoirs in our local mountains.

(2) It is possible, but not likely, that the maintenance or removal of forest cover will become a useful factor in the control of floods, by desynchronizing of time of arrival of flood peaks from tributary drainage areas.

(3) The watershed cover in retaining the soil on the watershed and lessening erosion is of great aid in the maintenance of channels. Perhaps the most difficult problem through the years in flood control, will be to maintain the flood channels with slopes varying from  $1\frac{1}{2}$  to 3 per cent at the canyon mouths to 0.1 per cent before discharging into the sea, on account of the inability of the stream to carry all of its load with decreasing slopes and velocities to the sea. Thus the streambeds will be filled up near the canyon mouths. Nature will still require areas for disposition of the heavier detritus.

(4) And now most of us recognize the fact that there are large areas on debris cones and other flood hazard areas which should never have been subdivided or improved, and that these valuable adjuncts of nature's streams should have been retained as perpetual desilting agencies, by which the flood streams are de-

silted and much of the water caused to percolate into the ground water basins. The effect of forest cover is of value here in diminishing the quantity of debris to be deposited.

In concluding this paper I should emphasize the fact that the greatest value of watershed cover to flood control is in retention of the soil, and diminishing the rate of erosion into the streams. The silt and debris once reaching a rivulet or stream, eventually must be deposited in large part on the valley floor, only the finest particles reaching the ocean. The useful life of all engineering structures involved in flood control whether for storage or channel protection, is shortened by the excessive erosion following the removal or loss of watershed cover.

We know that the forces of erosion in spite of any effort by man, will eventually wear the mountains down to a peneplain as has been done throughout the geological history of this planet. Sometimes I have pondered over the question of whether this process would be ultimately affected by the preservation or continuous removal of the watershed cover. But this question is wholly academic, for we have sufficient observations to know at least qualitatively that our flood control problems are made vastly more or brush cover, and the immediate erosion difficult by the loss of the native forest problems involved.

Unfortunately, I am somewhat of a pessimist when it comes to believing that we shall ever obtain full perfection in protecting our watershed cover, although we should ever strive to do so. Therefore, I believe that we should study the mountainous areas in detail in advance of fires as suggested by Dr. Kotok, so as to be prepared to carry out the most prompt remedial measure to protect the public from damage and loss of life, should fires occur in spite of all efforts to prevent them.



# FOREST FIRES AND ACCELERATED EROSION

By CHARLES A. CONNAUGHTON

*Intermountain Forest and Range Experiment Station*

Articles in the February JOURNAL OF FORESTRY have again raised the question of the desirability of protecting wilderness areas from fire. The value of the forest cover on these areas from the standpoint of watershed protection was an important point under discussion, but without very much in the way of specific data upon which to base an argument either for or against. The article presented here partially fills that gap by offering concrete information on the relation of fire to erosion in central Idaho, and indicates the necessity of fire protection as a watershed management measure.

THE effect of fire on accelerated erosion is one of the most important phases of the fire damage problem in the ponderosa pine forests of central Idaho. The extent to which fire may contribute to acceleration of erosion on forest lands of this type was partially determined in 1932 by means of a survey of a portion of a 45,000-acre fire area located on and near the Payette National Forest. This area had been burned over in late August, 1931.

The fire damage survey was made on 3,390 acres of heavily cut-over and 4,700 acres of virgin forest land by means of the line-plot method of sampling. Data were obtained with respect to whether or not there was acceleration of erosion following the fire, the percentage of slope on which the erosion occurred, and the intensity of the burn on each of the 1,357 plots established on cut-over land and the 1,880 plots on virgin forest land.

Accelerated erosion was found to have occurred on 42 per cent of the plots established on cut-over land and 28 per cent of the plots on virgin forest land, irrespective of slope or intensity of the fire. In general, the more wide-spread occurrence of erosion on the cut-over area appeared to have been due to a combination of factors which increased the erosiveness of the soil. One of these factors was the loosening of the soil by trampling, the cut-over area having been much more heavily grazed prior to the fire than

the virgin timber area. Another important element which contributed to the loosening of the soil was the intensity of the fire near the surface of the ground. The cut-over area had a dense stand of undergrowth and a large quantity of debris on the ground resulting from logging operations during the 8 to 10 years preceding the fire, as compared to a moderate stand of undergrowth and no logging debris on the virgin timber area. This accumulation of fuel near the surface of the ground on the cut-over area permitted hot surface fires, which influenced the physical properties of the soil more than the less intense surface fires on the virgin timber area.

Figure 1 shows the percentage of plots on which there was accelerated erosion in each slope class, segregated according to the degree of intensity of burn. The term "ground fire" designates fires of so low intensity that they consume merely the litter and debris on the ground, while "surface fires" consume also the foliage of the lesser vegetation and small reproduction. Fires of the former class often spread over considerable areas during periods of comparatively unfavorable burning conditions, particularly at night.

As brought out in this figure, there is a decided increase in erosion with either increase in slope or increase in intensity of burn, except for a few slight irregularities in lower slope classes which are attributed to the small number of samples

representing these conditions. This accelerated erosion is undoubtedly more or less temporary, pending reestablishment of herbaceous and woody vegetation. It is probable, however, that the same general relationships will continue to exist until a post-fire equilibrium of vegetation and soil is reached.

The lack of variation between the erosion in the two most intensively burned classes on the cut-over area and the marked variation in these same classes on the virgin timber area presents a point of interesting significance. On the virgin forest area a severe surface fire, which is represented as second in intensity of burn only to that of a crown fire, consumed practically all of the lighter fuels on the forest floor, including brush and reproduction. In addition the heat created by a fire of this type was sufficient to kill

the foliage on the larger trees, leaving it to dry out and ultimately to drop to the forest floor. Likewise the severe surface fire consumed practically all the lighter fuels which were present on the forest floor on the cut-over area, but there was only a very scant overstory of larger trees to supply dead foliage after the fire.

Both areas, therefore, were on a par immediately following the fire in so far as surface covering of vegetation was concerned. However, the foliage from the dead trees on the virgin timber area began to fall within a short time after the fire. Litter thus produced accumulated on the ground throughout the autumn and winter. By the time of spring run-off and the more or less torrential rains of the following summer, which actually caused most of the erosion, there was a fairly dense and uniform mat of litter covering the ground beneath and surrounding the dead tree crowns. This needlecast by dead trees furnished protection to the soil and accounts for the lesser erosion on the severe surface fire areas on the virgin timberland.

On the cut-over land such a needlecast was impossible owing to the lack of an overstory of dead trees, and the soil was no more protected on severely burned surface fire areas than on the crown fire areas. Consequently there was little difference in erosion on areas burned over by a crown fire or by a severe surface fire on the cut-over land.

It may be possible that the coarse, loose granitic soil which is characteristic of the fire area somewhat emphasizes the effect of slope and intensity of fire on erosion. However, regardless of this fact, it is apparent that many areas of virgin and particularly cut-over forest land in regions of steep topography should be protected from fire, if only from the standpoint of watershed management.

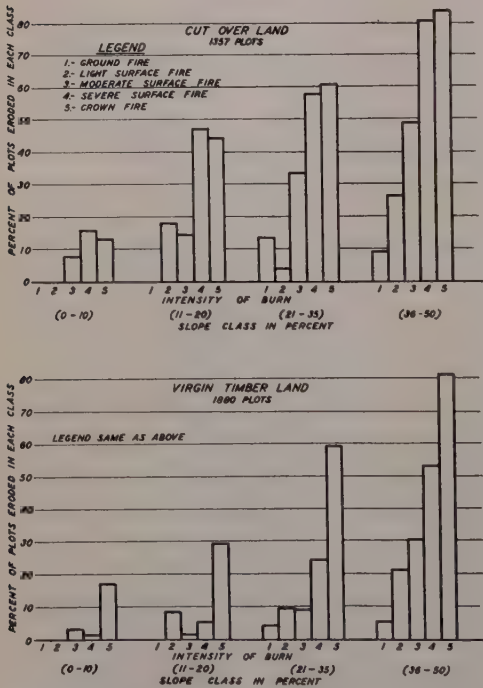


Fig. 1.—Acceleration of erosion following fire in relation to slope class and intensity of burn.

## POWER PRUNING

By JOHN B. CUNO

*Forest Products Laboratory, U. S. Forest Service*

A LIGHT-WEIGHT power-driven pole saw has been developed at the Forest Products Laboratory. This power pruner promises to make pruning a more practical part of forest management, affording additional woods employment and more than repaying its cost in the shorter rotation required to produce high-quality lumber. It consists of a small gasoline engine, a flexible shafting with housing, and a circular saw. The entire unit can be mounted on either a toboggan or a light wheel gig so that it can be easily dragged through the woods (Fig. 1). The saw, which is driven by means of the shafting, operates without fatiguing the operator as does hand pruning. It also makes a much smoother cut for healing and does not leave stubs. Various lengths of interchangeable hollow aluminum tubing enable pruning up to approximately 14 feet above the ground. The complete outfit weighs 60 pounds and can be manufactured for approximately \$150. The design and development of this unit is largely the work of engineer B. G. Heebink and has been made possible through E.C.W. funds.

Although the work has not proceeded far enough to formulate any conclusions as to the practicability of this power pruner in actual wood operations or to warrant its hasty commercialization, there is little reason to doubt that such a unit is potentially susceptible of reducing pruning costs. An analysis of lumber grades from two second-growth loblolly pine stands indicates that had the trees been pruned to a height of 16 feet when 4 inches d.b.h., the lumber value of the stand would have been increased almost \$100 per acre.

Electricity and compressed air have also been considered as sources of power for the saw. High cycle electric motors, which do not burn out should the saw pinch, have sufficient power and lightness to compare favorably with the flexible shafting just described. The smallest gasoline engine and electric generator that would be practical for woods work with one saw would weigh 240 pounds, which is more than one man could easily



Fig. 1.—Forest Products Laboratory portable power pruner.



drag through the woods. In order to operate more than one saw at a time, say two or three lines of current from the same source of power, heavier equipment would be required. With such equipment some form of traction, such as a light crawler tractor, would be necessary. On the other hand, long lines of wire would be lighter and more pliable than flexible shafting, and would allow an operator to get about the woods and prune easier. Half an acre would be pruned from one set-up with wires 100 feet long. It is conceivable that with the heavier electrical equipment a portable chipper might be operated to hog the branches—either for use or at least as a means of brush disposal. Air com-

pressors capable of supplying only one line of hose are even heavier than electric generators large enough to run two or three electric motors.

A power saw, of course, may find use not only in pruning branches on standing trees in the forest where the growth of clear wood for sawlogs or veneer is the objective, but also in releasing small suppressed trees from the overtopping branches of less desirable species, such as aspen over spruce in the Lake States. It offers possibilities in lopping felled tree tops and cutting out undergrowth in the forest, as well as in other than forest improvement, such as street and park tree trimming, roadside trimming by telephone linemen, and the pruning of fruit trees in orchards.



#### **ANNUAL MEETING TO BE HELD IN ATLANTA, GA.**

The 35th annual meeting of the Society will be held at Atlanta, Georgia, January 27, 28, 29.

The chairman of the committee on arrangements and program is Joseph C. Kircher. Further announcements will be made later regarding the program.

## NEW TRACTION DEVICE FOR TRUCKS

The article which follows comes from the advertising department of the By-Products Steel Corporation, manufacturers of the device described. Their offered contribution is published in the JOURNAL because the information it contains will, it is believed, be useful to foresters.

**B**ECAUSE of the necessity of operating fire pumpers and other apparatus cross country and through muddy and soft terrain in fighting brush and forest fires, a number of fire departments have been forced to resort to the use of expensive tractor type equipment especially developed for the service. Now, a new and more economical tool has made its appearance in the form of a traction device, known as the Hipkins Tractioneer, which is applicable to dual-tired pneumatic driving wheels of two-wheel, four-wheel, or six-wheel drive fire apparatus.

The Tractioneer consists of a series of U-shaped pressed steel shoes with V-shaped brackets on the backs of the shoes that fit into the groove between the two tires of the wheel. Through the brackets a connecting chain of the length required by the wheel circumference is passed, so that the entire assembly is flexible and can adjust itself to variations in contour of the ground.

Power is transmitted from the tire treads through the steel shoes and there is no torque strain on the parts connecting the steel shoes. As the wheels revolve, the Tractioneer creeps around them, thus preventing undue wear on any part of the tires or the Tractioneer itself. Nevertheless, the Tractioneer is so constructed that the wheels do not spin inside the Tractioneer.

Because of the flexible construction of the device, the full edge area of the steel shoes is always in contact with the underfoot surface. The apparatus and tires are thereby relieved of undue stress, strain and abuse in passing over rough terrain and obstacles.

That Tractioneer-equipped fire apparatus can operate over practically any terrain is due to the greater flotation provided for the load of the vehicle by the steel shoes of the Tractioneer. For a 4-wheel, 2-wheel drive vehicle with 6.00/20 6-ply bus and truck balloon dual tires, at 45 lbs. inflation recommended by the tire maker, and under the recommended gross load per tire of 1,400 pounds, the deflection is about .89" per tire, thus giving a ground contact area of about 117 square inches for the four tires. When the same vehicle, with the same tires, inflation and loading, is equipped with the Tractioneer, the maximum ground contact area is about 400 square inches for the four tires, an increase in ground contact area of 283 square inches, or 241 per cent for this tire size.

Without the Tractioneer, the approximate ground pressure for the vehicle and loading is 48 pounds per square inch. With the Tractioneer, the minimum ground pressure is 14 pounds per square inch, a reduction in ground pressure of 34 pounds per square inch, or about 71 per cent for this tire size.

The increase in ground contact area and reduction in ground pressure provided by the Tractioneer vary, of course, with the size of tires with which the apparatus is equipped and with the size of Tractioneer required by the vehicle. Nevertheless, the increased ground contact area and reduction in ground pressure provide the higher degree of flotation in combination with traction that are so essential to enable fire apparatus to operate across-country with its incident steep grades, soft terrain and other obstacles

generally encountered in reaching the scene of off-road fires.

Another equally important feature of the Tractioneer is the fact that it greatly reduces the amount of wheel slippage. Tests on this point were conducted at the Aberdeen Proving Grounds in Maryland with a 1½-ton vehicle loaded to capacity and run over a mud course, first without chains or Tractioneer, second with chains on the rear wheels, and last with the Tractioneer on the rear wheels. Without chains or Tractioneer, the slip was 25.70 per cent. With chains on the rear wheels, the slip was reduced to 22.60 per cent. With the Tractioneer on the rear wheels, the slip was only 5.30 per cent. At the same time, the drawbar horsepower of the vehicle was greater when equipped with the Tractioneer.

The Tractioneer was developed by O. F. Hipkins, formerly of the Ordnance Department of the United States Army. Since 1929, the Army has been using the Tractioneer and their tests have caused this equipment to be considered an integral part of the Army's motorization program. The Tractioneer is now manufactured by By-Products Steel Corporation, Coatesville, Pa.



Tire with Caterpillar Tread

Installation of the Tractioneer is a one-man job and requires only about 10 minutes of time, while it can be removed in five minutes. If the vehicle is stuck in mud, it is possible to apply the Tractioneer without jacking up the wheels. Both four-wheel and six-wheel vehicles may be equipped. If the proper links and shoes are on hand, the same unit can be made interchangeable for the two types of trucks. The double axle installation goes on like a caterpillar.





## BRIEFER ARTICLES AND NOTES



### THE DEDICATION OF THE RICHARD T. FISHER MEMORIAL

On June 9, 1935, beneath a cluster of ancient white pine, hemlock, and hardwood—a most appropriate setting—President James B. Conant of Harvard University assisted in the dedication of a bronze memorial tablet to the late Professor R. T. Fisher. The ceremony was held at noon, on the Tom Swamp Tract of the Harvard Forest at Petersham, Massachusetts. Despite the intermittent heavy rain, some 150 friends, relatives, alumni of the Harvard Forest School, and professional colleagues were present. The site for the memorial is a lovely woodsy spot, and is regarded as singularly fitting, inasmuch as Professor Fisher often went there to study and to photograph the interesting wild life in the game sanctuary of which this area is a part.

Mr. John S. Ames, '01, President of the Forest School Alumni Association and donor of the lands making up the Harvard Forest, presided and in a brief address told how the tract was obtained and how it had become the oldest managed forest in the United States. He further mentioned how justly proud Professor Fisher was of its growth and of the increasing number of visits made by technical foresters from various portions of the world.

Mr. Henry H. Tryon, '12, Director of the Black Rock Forest at Cornwall-on-Hudson, N. Y., and Chairman of the Fisher Memorial Committee, spoke briefly of the well-nigh unanimous admiration and loyal affection which the alumni held for their former Director, and added that there could be no more fitting place for the memorial than this spot, where he loved to come.

President Conant, before lifting the simple spray of spruce and larch which covered the tablet, touched perhaps the true dedicatory note: "Professor Fisher was the real creator of this Forest. His untimely death prevented the completion of many well-laid plans that he had in the making. His death will even more closely unite the Forest with Harvard University. Professor Fisher was continually laying plans for the advancement of this wonderful work; it was only a short time before his sudden death that he discussed with me at some length the future of the work here. These plans now rest with us to carry out. On behalf of the Governing Board of Harvard University I accept this memorial with a full sense of the responsibility which is implied therein, and with a renewed gratitude for Professor Fisher's outstanding work."

Some of those present included: Mr. and Mrs. Peter Frothingham, Mr. and Mrs. William James, Mr. Henry James, Dr. Thomas Barbour, Dr. E. G. Stillman, Mr. E. S. Bryant, Dean George S. Chase, Mr. A. H. Upham, Mr. Wm. G. Howard, State Forester of New York, Mr. H. O. Cook, State Forester of Massachusetts, Mrs. George R. Agassiz, Dr. R. H. Wetmore, Prof. Henry V. Hubbard, Dr. John C. Phillips, Prof. Irving I. Bailey, Prof. Harlow Shapley, and many others.

The full text of Mr. Ames' address follows:

"We Alumni of the Harvard Forest School have planned the exercises here today in a spirit of affection and loyalty to the memory of a dear friend and teacher. Just as the name of Charles Sprague Sargent is inseparable with that of the Arnold Arboretum, so the name

and memory of Richard Thornton Fisher is as closely bound with that of the Harvard Forest. One cannot think of the Harvard Forest without thinking of Dick Fisher. His presence is everywhere.

"It was he who, after examining different pieces of woodland, selected this tract in Petersham as the best adapted for instruction, research, and the practice of forestry. Upon his recommendation then these woods were acquired, and since that day in 1908 the management of the Forest has been under his wise direction.

"It is interesting to note that this is the oldest scientifically managed forest in the United States. How proud he was of its growing reputation when he mentioned in his report as Director in 1927 that the Forest had been visited that year by the Chief of the U. S. Forest Service, the Director of the Swedish Forest Experiment Station, and other foresters from Finland, Denmark, Germany, Canada, and Japan. Perhaps one of his most striking accomplishments is contained in his report as Director for 1927-28. He states that in the twenty years during which the forest has been operated by Harvard, the original stand has been increased from 10,-

500,000 board feet of saw timber to 12,000,000, and the annual growth from 250,000 board feet to 400,000, while 4,000,000 board feet have been sold during that period. In other words, in twenty years the capital of the Forest was increased 12½% and the interest 60%.

"Here he was happy doing his life's work in the surroundings he so dearly loved. What more beautiful memorial could he have than these woods, which should exist as long as there is life upon this earth. It seems to me that his character is reflected in the quiet depths and beauty of our surroundings. We Alumni mourn his loss, but rejoice that we should have been privileged to have had his friendship."

Mr. Tryon said:

"My brief part in this ceremony is to bring into a little sharper focus the more intimate reasons for this memorial. I do not find it altogether easy. I should perhaps amplify Mr. Ames' statement to tell you that it represents the spontaneous manifestation, by the Alumni of the Harvard Forest School, of their singularly unanimous admiration and loyal affection for our former Director. And from all



the pleasant acres in this Forest, this spot, where Dick loved to come, has been rightly chosen as the most fitting site for the simple tablet.

"It seems quite fitting to make brief mention of the distinct scientific achievements which were crystallized here, under his directorship. A number of definite contributions to our knowledge have been made, many of which have proved to be of such solid technical and practical value as to place the profession of forestry deep in his debt. These professional accomplishments will form a lasting monument to his sound and strikingly simple policy of working in harmony with nature.

"But I am sure we shall remember even more the man himself. The qualities which lay in him, which so greatly endeared him to us, were the sort that endure. It has been so truly said of Dick: 'He was an idealist, with the love of beauty so filling his life that in spite of his great gift of making all men his friends, he seemed a little apart from them all.' I am sure that even the inexorable processes of time will not quickly erase the imprint of that simplicity, that understanding sympathy, that ready, unostentatious generosity, that quiet, pungent, salty humor, that erect mental posture. For myself—and I know that I speak for others—when I was with him the sun seemed to shine a little brighter. Association with Dick, either as teacher, as professional colleague, or as friend, carried inspiration of a high order. So we place here this simple, tangible evidence of our devotion. And as we leave this spot, I feel that we may all quietly rejoice that our lives have been enriched through knowing this great teacher, this rare friend, this very gallant gentleman."

### THE CHI-SQUARE TEST IN FREQUENCY CURVES

In a study of the distribution of diameters in even-aged stands,<sup>1</sup> the author has made use of a number of permanent sample plots established in 1906. By using each remeasurement of each plot as a sample of diameter distribution, one hundred and eleven different distributions were obtained although only 34 different areas were involved. In order that one average distribution for the total of 36,441 trees studied might be arrived at, the diameters were converted into standard units in the following manner: "The mean of each plot was equated to zero and the number of trees, as a percentage of the total, was determined by one-half standard deviation classes." The frequencies were then combined and an average frequency distribution for the 111 samples was obtained.

The next step was the fitting of five theoretical frequency distributions, (namely: Charlier's type A, type B-2 and 4 term, Pearson's type 1 and 3) to the average distribution of all the samples. The agreement of the theoretical curves with the observed distribution was tested by Pearson's Chi-square test of Goodness of Fit. However, instead of converting the frequencies back to absolute numbers, the author computed Chi-square using frequencies expressed as percentages. His justification for this is that the Chi-squares are here used only for comparative purposes. The interpretation of Chi-square used in this paper is incorrect. The author concludes that the theoretical curve having the lowest Chi-square is the curve of best fit. However, Chi-square cannot be used to measure the relative goodness of fit of several different types of curves in this manner.<sup>2</sup> To mean any-

<sup>1</sup>Schnur, G. L. Diameter distributions for old-field loblolly pine stands in Maryland. Jour. Agr. Research, 49:731-743. 1934.

<sup>2</sup>Fisher, R. A. Statistical methods for research workers. London. 1925. p. 78.



thing, Chi-square must be converted into probabilities by use of a Chi-square table. The probability determined in this way is interpreted as the chance that, if the observed distribution were in agreement with the theoretical one, further trials would result in as bad or worse a fit than the one already obtained.

But slight differences in the probabilities for different curves cannot be interpreted to mean that one type of curve is a better fit than another. The mistake is one which has appeared before in forestry literature. Even when the theoretical frequency distribution is a known quantity, it will be found that repeated samples drawn from the universe and tested against the known distribution by means of Chi-square will give probabilities fluctuating around .50. Thus it is evident that if a single sample fits one theoretical curve with a probability of .70 and the same sample fits a second theoretical curve with a probability of .40, it cannot be said that the first curve is a better representation of the universe from which the sample is drawn. Even if both curves should be excellent fits, a second sample might easily reverse the situation since the probabilities would both be fluctuating around a value of .50, and the one which gave a value of .70 with the first sample might show a probability lower than .50 with the second sample, while the reverse could easily be the case with the other curve.

The author concludes that any of the five theoretical curves give a good fit since the Chi-squares of all of them are low. However, he has expressed the Chi-squares in per cents and neglected to convert them back to absolute numbers. This can be done very simply by multiplying the Chi-squares expressed as per cents by the total number of trees used in determining the distribution (in this case 36,441) and dividing the result by

one hundred. When this is done and the Chi-square is looked up in the Chi-square table it will be found that the probability of such a bad fit occurring as a result of chance for the best of these curves is beyond .01 (it is in fact beyond the range of most Chi-square tables). Only one interpretation is possible; all of the theoretical curves fit the observed data so badly that there is very small chance (considerably less than one chance in a hundred) that these curves are the correct ones to describe this material.

An explanation of the failure of the theoretical curves to fit the empirical data may possibly be found in the fact that the same plots were used repeatedly. If any plot happened to have an extreme peculiarity in its distribution of diameter classes it is probable that this would be carried through a number of years and each use of this plot would increase the effect of the abnormality on the total distribution of trees on all the plots.

R. H. BLYTHE, JR.,  
*Lake States Forest Exp. Sta.,*  
*U. S. Forest Service.*



#### DEFECT DEDUCTION FOR THE ONE-QUARTER- INCH INTERNATIONAL LOG RULE

The legal adoption in 1931 of the one-quarter-inch International Log Rule by New York State was the practical debut of this rule. Thereafter it ceased to be of academic interest only, and will no doubt be more widely used in the near future in actual scaling practice. In the past it has been used primarily in the construction of volume tables for calculating the scale of sound logs. In the future, however, defective logs will have to be scaled. Therefore, a "standard rule,"<sup>1</sup> similar to the standard rule,

<sup>1</sup>If this rule for defect deduction has been published elsewhere, the author is not aware of it.

$\frac{W'' \times T'' \times L'^2}{15}$  for the Scribner Decimal

15

C log rule, will be necessary and very helpful in making the proper deductions for defect.

The foregoing formula can not be used with the one-quarter-inch International Log Rule, because an allowance for shrinkage was not made when it was derived from the board-foot formula. In the preparation of the log rule,  $1/16''$  was deducted for shrinkage in addition to the  $1/4''$  for saw-dust, making a total allowance of  $5/16''$  for each one-inch board. Consequently, the volume of seasoned one-inch lumber that can be sawn from

a solid timber will be  $\frac{16}{21}$  or 76.2 per

cent of its original solid value. The standard rule for deducting defect is

therefore,  $\frac{16}{21} \times \frac{(W'' \times T'' \times L')}{12}$  or  $\frac{W'' \times T'' \times L'}{15.75}$ , or rounded off,

$\frac{W'' \times T'' \times L'}{16}$ . Rounding off this

constant to 16 introduces an error of only 1.6 per cent, which of course is negligible for this work.

For convenience in scaling, and to eliminate costly tables, the formula is given in alinement-chart form in Figure 1 for both circular and rectangular defects. To read a circular defect volume, merely pass a straight edge through the diameter and length of the defect on their respective axes and read the volume from the circular defect volume axes, as illustrated by the solid line in the chart. To read the volume of a rectangular defect, first pass the straight edge through

STANDARD RULE FOR DEDUCTING DEFECTS  
FOR THE INTERNATIONAL  $\frac{1}{4}$  LOG RULE

BOARD FEET =  $\frac{W'' \times T'' \times L'}{16}$  OR  $\frac{D''^2 \times L'}{16}$

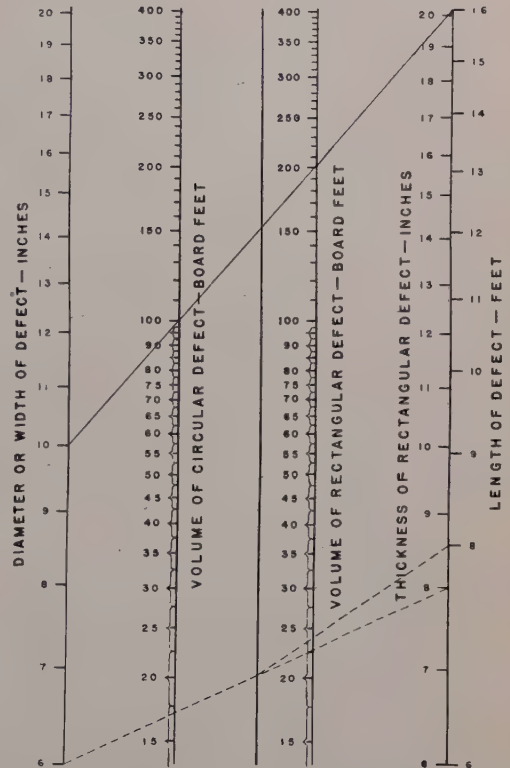


Fig. 1.—Alinement chart for determining the board-foot volumes of defects by the standard rule,  $\frac{W'' \times T'' \times L'}{16}$  or  $\frac{D''^2 \times L'}{16}$ , which is recom-

mended for use with the one-quarter-inch International log Rule.

the width and thickness of the defect and hold the point of intersection on the central ungraduated axis. While holding this point, pass the free end of the straight edge through the length of the defect and read the volume on the rectangular defect volume axis. This procedure is illustrated by the broken lines in the chart. Volumes of defects longer than 16 feet can be obtained by doubling

<sup>2</sup>W: width—T: thickness—L: length.

the volumes of defects one-half the required length.

It was found that the volume of a small defect could be computed as rapidly as it could be read off the chart, and some of the smaller graduations were accordingly eliminated from the chart.

In applying this rule, the practices that have been used in applying the standard rule for the Scribner Decimal C log rule should be modified as below:

1. Do not deduct for defects falling outside the cone frustum corresponding to a taper of two-inches in 16 feet.

2. Within this cone frustum, allow a one-inch collar for slabs and do not deduct for defects or parts of defects that fall within this collar.

3. Do not add one-inch to the diameter or dimensions of the defect before substituting in the formula or reading the volume from the chart, because the rule itself overestimates the volume of the defect, especially the volume of circular defects.

4. Wherever the defect is visible at both ends of the logs, use the average diameter of the defect to compute its volume regardless of the length of the log.

5. Round off the defect to the nearest five board feet before computing the net scale.

R. M. BROWN,  
*Univ. of Minnesota.*



#### MANWOOD'S PROJECT FOR BETTER LAND USE IN 1609

When John Manwood, Barrister of Lincoln's Inn and Gamekeeper of Waltham, published his great "Treatise on the Lawes of the Forest" in 1598, he included a number of ancient forest codes, among them the one attributed to King

Canute the Dane. In his "Preface to the Matter" he comments on his inclusion of these very ancient laws in these words: "For although that they have been raked up a long time in the embers of oblivion, yet they are worthy to be remembered again."

While many foresters know something of Manwood's "Lawes" they are probably less familiar with what is believed to be his only other published work, the "Project for Improving the Land Revenue by enclosing Wastes." This was written by him for Sir Julius Caesar, Chancellor of the Exchequer to James I of England. Although it is dated April 27, 1609, it might, in spirit at least, have been written only yesterday. This contribution to the solution of the land use problems of an earlier day has been raked up a long time in the embers of oblivion but surely, in view of the many land use problems that confront us today, it is worthy to be remembered again.

R. P. HOLDMUTH,  
*Amherst, Mass.*

MANWOOD'S PROJECT FOR IMPROVING THE  
LAND REVENUE, BY INCLOSING WASTS. FOR  
SIR JULIUS CAESAR, 27TH APRIL, 1609.

Whereas the King's most excellent Majesty hath within this his realm of England great abundance of vacant and waste ground, whereof now his Majesty hath no profit at all, nor his subjects very little benefit or good thereof, because the same lieth waste and common unto all men; as in his forests, parks, and chaces, and in divers other places of waste ground within this realm, which by reason that the same is not inclosed nor inhabited with honest and industrious people, that may convert the same into tillage, and pasture, and other such profitable uses for the good of the Common Wealth, his Majesty receiveth no profit thereof.



His Majesty may therefore grant unto 5000 Yeoman, every one of them 100 acres of those lands, for some term of years; in consideration of which grants and leases every one of those Yeoman shall take and inclose the same; and to build upon every hundred acres of land a good sufficient farm house to dwell in, with barns, and other necessary buildings for the same; and every such Yeoman to yield and pay yearly unto his Majesty, his heirs and successors, for the same £.20 per ann. which will augment and increase his Majesty's revenues for ever a hundred thousand pounds yearly.

By such leases and grants his Majesty's forests, chaces, parks, nor game shall receive no hurt nor prejudice, but be rather increased and better cherished, the soil being made more fruitful; and every such grantee or lessee may and will be bound by his lease and covenant to be a keeper and preserver of the deer, so long as they are in their ground, and also to preserve the woods, and game of hares, pheasants, and partridges; and yet this shall not hinder any officer of the forest, nor his Majesty's pastime in hunting: and in all such inclosed grounds and

farms there may be meet and convenient gates and places of passage, for his Majesty, and his train, when they shall hunt there.

King William the Conqueror was chronicled for depopulating 36 parishes, and pulling down of so many churches in New Forest, and turning the soil into forest; but the King's Majesty shall be thrice renowned for ever, in setting up so many good farms, and dwelling houses, for men to dwell in, and live upon, whereby ten times 5000 people shall be maintained to live. By this means his Majesty shall be better enabled in force and strength, by raising of so many able subjects, his subsidy so much increased, the Common Wealth greatly enriched, and bettered, by providing of so many dwelling houses for so many desolate people, which now do want places of habitation. This will also bring down the price of beef, mutton, butter, cheese, corn and grain, and all manner of victuals, which will be a means to set a number of idle people on work, whereby to avoid idleness and drunkenness, and all other fowl vices which do reign chiefly by idleness.



## REVIEWS



**Die rechnerischen Grundlagen der Kontrollmethoden.** By H. A. Meyer. *Beiheft Nr. 13 zu den Zeitschr. des Schweiz. Forstvereins, Zurich, 1934, pp. 122.*

Many European foresters feel that periodic inventories of forest tracts cannot be taken accurately enough to render the determination of the increment from them with sufficient reliability to serve as a basis for regulating the cut. This has been, aside from the cost factor, the chief objection to the application of the control method. H. A. Meyer shows that with conscientious work according to a strictly defined practice and well regulated calipers the volume of stands can be determined accurately enough for large areas to dispel these objections.

This study concerns itself mainly with those errors of observation which have a vital influence on the calculations of the increment. Its purpose is to analyze the source of errors and to determine mathematically their probable magnitude. It must be remembered that the control method as developed by H. E. Biolley is more interested in relative volumes (sylvcs) than actual volumes ( $m^3$ ).

The material for this study was taken from five plots of an average area of 4.3 acres each. The repeated cruises were made strictly according to the rules prescribed by the method of control. Twelve separate inventories were made of each plot. All trees over 6 inches d.b.h. were measured with calipers and tallied by 1 cm d.b.h. classes. The trees were later combined into groups of from 1 to 8 cm d.b.h. classes, to study the effect of this practice on the mean basal area error.

The error, caused by the formation of larger classes, is for practical purposes insignificant. The standard error of the totals of the 12 basal area measurements was between 0.2 and 0.3 per cent. The errors resulting from measuring a stand with calipers are grouped in three classes for further analysis.

1. Errors due to calipers which have too much play in the movable arm.

2. Chance errors due to the irregularity of the cross section of the trees at breast height.

3. Errors resulting from tallying the trees by diameter classes instead of by actual diameters.

The first type is the most serious of these errors, because it gives consistently too small results. Its maximum should never exceed 1 per cent of the basal area. In the calculation of the increment this error also becomes a chance error, and may cause either too large or too small values.

The author presents at the end some valuable pointers indicating how the forester can minimize the influence of avoidable and unavoidable errors of measurements on the calculation of the increment of stands.

Since only the knowledge of the mean errors of observation enables one to interpret correctly increment determinations based on periodic cruises of a stand, Meyer's careful study should be of interest not only to foresters who use the control method, but also to research workers engaged in studies of permanent sample plots. This study would indicate that the diameter tape is a more satisfactory instrument for this purpose than the caliper.

R. STAHELIN,

*Calif. Forest Exp. Sta., U. S. Forest Service.*

**Report of the Forest Products Research Board for the Year 1933.**

(Princes Risborough) *Bulletin of the Department of Scientific and Industrial Research*, London, 1934, pp. 67, figs. 6.

This report is a rather superior example of the printers' art, for productions of its type. A country with an empire as its field naturally takes a broad viewpoint in planning its research. It is worth observing that the Assistant Director of Forest Products Research, Major Oliphant, was sent to Nigeria and the Gold Coast to secure a more intimate contact with timber producers in the colonies and the timber consumers in various parts of the Empire, and that this trip proved of such value that a second visit, to British West Africa, was authorized. While our own work has been largely restricted to timber native to the United States, tests are described upon some forty "overseas" species, mostly unfamiliar to us.

According to the report, interest in the work of the Laboratory is increasing, notably in advisory work, which is ascribed in part to press publicity and to radio talks. The number of employees of all ranks was 155 at the end of 1933. The main part of the report is given to the Program of Research. The 62 subjects covered are the usual ones, and need not be listed. Kiln-seasoning formed an important part of the work. One of the natural draught kilns was changed to a Clarke (Australia) kiln, and "in view of the popularity of the internal-fan kiln in the United States of America and the growing use of this type in this country" the former water-spray kiln was converted into one of this type. Kiln drying experiments on a large scale were completed on Scots pine, ash, common elm, Dutch elm, oak, Sitka spruce, sweet chestnut, Queensland walnut, mora, Santa Maria, East African camphorwood, banak,

and Ceylon gurjun. Nothing distinctly new is noted from the kiln drying experiments, but it is interesting to learn that there was an increase of 40 per cent in the number of inquiries, over 80 per cent of which were from trade sources asking for practical advice.

Mechanical tests and relations of structure to strength occupy, naturally, a large part of the program. An interesting observation is that in the case of ash it has been shown that for any given density an increase in the proportion of summerwood in the annual ring is accompanied by a decrease in mechanical strength, which is ascribed to a decrease in the thickness of the walls of summerwood fibers. Cricket bat willow continues to loom large in importance to Britishers and the question of the best species is ever a perennial one. Study has been given to the measurement of machine finish by optical as well as mechanical methods, and of the effect of variation of the cutting angle.

In a study of thermal conductivity, cast sulphur was found to be a suitable non-hygroscopic substance for comparison, whose diffusivity is approximately the same as wood.

Tests of shrinkage of old 14th century and fresh wood indicated that there was no material difference in shrinkage and expansion. Moisture equilibrium values vary slightly, however, each time wood passes through a re-wetting or drying cycle.

It is interesting to read that after a survey of various laboratory methods of making fire tests an apparatus similar to that used at the Forest Products Laboratory at Madison, Wis., is being constructed.

Judging by the space devoted to the subjects, the problems of damage by insects and decay are the most significant of all. The lyctus or powder-post beetles play an important part. In this connection it is of importance to note that in



dry kiln operation all larvae were killed after four days, during which the temperature varied between 95° and 125° F. and the humidity averaged 65 per cent. This seems a strangely low temperature to be effective in this respect. The death-watch beetle is again heard from and appears to be causing considerable worry; and likewise the pin-hole borers in Empire timbers. As to fungi (their name is legion!) a yellow stain mold causing "golden oak" (*Penicillium divaricatum*) was found to grow rapidly up to 42° C. (107.6° F.), but sterilization occurred at 100° C. in saturated steam for two hours.

The most durable of the new Empire timbers investigated were found to be purpleheart, wallaba heartwood, ofun, and western red cedar.

An experimental house had been built for determining the progress of dry rot, etc. No decay had occurred in boards laid directly on a moderately thick layer of bitumen above concrete in which the moisture was found to be 16 to 20 per cent. Rotting was extensive in boards embedded in concrete and covered with an impervious covering in which the moisture ran up to 41 per cent. Most of the decay has been caused by *Coniophora cerebella*. A ventilated floor which remained at 18.5 per cent was too dry for attempted infection by *Merulius* and remained sound.

Chemical studies have been continued especially as to lignin determinations and constitution of hemicelluloses.

Several pieces of new apparatus have been designed and constructed. One, illustrated, is for tests in wood bending in which the end thrust can be measured.

Apparatus for determining the cell-space ratio, or percentage of void space, has been completed by which the degree of light penetration through thin sections is measured by means of a photo-electric cell. One wonders why this quantity can not be more reliably and much more easily calculated directly from the dry

density of the block, knowing that wood substance weighs 1.56 grams. Just what voids are measured by the light method and to what extent intra-micellar voids are included is questionable.

One looks in vain for any mention of the important factor of collapse. Not only in kiln drying is this of fundamental importance in the case of all impervious woods, but also in all shrinkage determinations. Moreover, it has great significance commercially, as is fully recognized in Australia. If Princes Risborough is going into the study of Empire timbers it will certainly have to give the subject of collapse prime consideration.

H. D. TIEMANN,  
Forest Products Lab.,  
U. S. Forest Service



**Meddelelser fra Det Norske Skogforsøksvesen.** Nr. 18 (Bind V, Hefte 3) 138 pages, Oslo 1934.

This report of the Norwegian Forest Experiment Station contains 3 papers, the first by Asbjørn Ording on pollen analyses in Norwegian coastal districts. Following the methods of von Post the author includes a number of diagrams showing the procentual distribution of pollen grains of different species at different depths in peat lands. Old stumps and remains of former roads were discovered in the peat in many places. These supplement the evidence from pollen that the climate is now more severe than in the past. Rainfall has increased. No conclusion can be reached about the migration of spruce. Any movement in recent times has been very slow.

A. Langsaeter reports the second section of his investigation of the accuracy of strip surveys, covering height determination and width of last 10 annual rings. About twice as many borings for a given area are required in Norwegian forests for the same accuracy as in the case of height measure-

ments. Standard deviations and errors are worked out for 32 different forests.

Dir. Eide describes interesting experiments made with sunken logs which were raised and dried. Logs which had been sunken a short time only could be driven satisfactorily after thorough drying. There seemed to be little difference between top and butt logs in sinkage. Especially interesting was the close correlation shown between rainfall and sinkage per cent over a 10-year period.

H. I. BALDWIN,  
*Caroline A. Fox Research and  
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### **Das naturliche Waldbild Europas.**

(The Forest Geography of Europe).  
By K. Rubner. *Zeitschrift für Weltforstwirtschaft*. Vol. 2, Nos. 1-3, pp. 68-155, 2 maps, 47 figs. 1934.

In this article Dr. Rubner has taken his book, *Die pflanzengeographisch-ökologischen Grundlagen des Waldbaus*, together with some added material, and from the combination has made a very condensed summary of the natural vegetation types of Europe. He has also roughly correlated them with certain types of climate, without trying in any way to determine the causes of their boundaries. Indeed, it can hardly be done in an article of 87 pages which contains the description of 101 separate forest territories, grouped in 9 broad regions, together with a fairly long discussion of climatic characteristics. Rubner does in this article what Zon and Shantz have done for the United States, plus a delineation of the basic climatic types of Europe. It is carefully done and is the fruit of long years of study, and while it is by no means a novel attempt, for Drude, Schimper, and many others have divided Europe into phytogeographic provinces and have described them, this work excels in

detail, and, I believe, in grouping, and should remain as a standard for a long time.

F. S. BAKER,  
*University of California.*



**A Swedish-English Vocabulary for Foresters.** By J. L. Deen and A. B. Benson in cooperation with M. Juhlin-Dannfelt. *Bull. 40, Yale School of Forestry*, 1935. New Haven, Conn. Price \$1.00.

A dictionary of Swedish forestry terms has long been needed. It is to the great credit of the authors that the present bulletin has actually appeared in print after all the abortive attempts which have been made at similar compilations. In fact, the present reviewer was a little hesitant to accept the invitation to review the present bulletin since he was engaged in 1923-24 and for a few years thereafter, in cooperation with a Swedish forester, in preparing a dictionary of this sort. The number of terms translated had reached over 4,000 by 1926 when Prof. Tor Jonsson submitted a copy to the U. S. Forest Service and JOURNAL OF FORESTRY at the time of his visit to this country. The matter was again discussed when Prof. Hesselman was here a year later. Finally, early in 1929 the writer attempted to secure publication of the dictionary in mimeographed form in time for the International Congress of Forest Experiment Stations at Stockholm, but the Swedish Forestry Association, in whom the title of the ms. was vested, so to speak, could not make the necessary arrangements in time. Appreciating the obstacles confronting dictionaries, the present reviewer, as the late Prof. Toumey would have said, takes his hat off to the present authors.

Thus provided with the background for an intensive criticism of the present bul-



letin, the writer is delighted to find so little to criticize. The spelling of Swedish words is practically flawless, a rarity in English printing, due partly to the proof-reading of Mr. Juhlin-Dannfelt, as the authors acknowledge. The English translations of Swedish words are more open to question. They are more often matters of usage or taste than actual mistakes. "Floating superintendent" instead of "Driving superintendent" is probably intended to cater to the use of the vocabulary in England, since "river boss" is added as a concession to Americans. There are a number of similar expressions which suggest that the dictionary was built up from literature (as intimated in the preface) rather than from experience in the field. The aim has been to limit the vocabulary to forestry terms not found in general Swedish-English dic-

tionaries. The chief exceptions seem to be botanical terms, and a few simple words such as "botany, botanist, entomology, etc." Terms used in the timber trade with England are a valuable addition, although they are not exhaustively complete. Any list of this sort can never hope to be complete at first. It would have been very desirable if one or two blank pages had been inserted after each letter, in order that the user of the book could insert new terms as encountered. The shortcomings and errors, if such there be, are not serious enough to require notice to the average user of the vocabulary. It is altogether a very excellent piece of work.

H. I. BALDWIN,  
*Caroline A. Fox Research  
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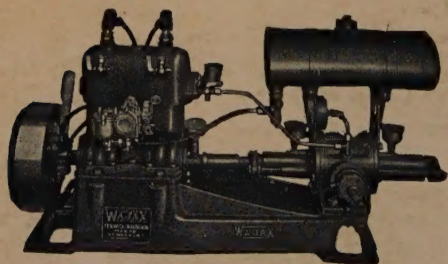
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